SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

        BE IT KNOWN THAT I, TERUYUKI MARUYAMA, a
citizen of Japan residing at Kanagawa, Japan has
invented certain new and useful improvements in

        WEB SERVICE PROVIDING APPARATUS

of which the following is a specification:-

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to a Web service providing apparatus, and more particularly

5 to a Web service providing apparatus that can perform various processes, such as copying and printing, on a document or an image stored in another connected apparatus through cooperation with apparatuses connected to the Web service providing apparatus via a network in

10 flexible manners, that is, even if a user is in front of any of the connected apparatuses and operates the apparatus.

In addition, the present invention relates to a Web service providing method performed by such a Web

15 service providing apparatus.

2. Description of the Related Art

In the prior art associated with processing for image data through cooperation with image forming apparatuses connected to each other via a network,

20 Japanese Laid-Open Patent Application No. 2000-6496 discloses an image forming apparatus, which can be connected to information output apparatuses via a network, designed to prevent quality degradation of an output image even if any of the information output

25 apparatuses in the network outputs the image.

However, since the disclosed image forming
apparatus is intended to cause other apparatuses
connected thereto via a network to output image data,
the disclosed invention does not cover other types of
5   information processing that are performed through
cooperation with the ·connected apparatuses. Accordingly,
the conventional image forming apparatus, if a
multifunctional product having various functions not
limited to image processing is connected to the image
10   forming apparatus via the network, cannot control
cooperation to perform such various processes that the
multifunctional product can provide. Hence, the
conventional image forming apparatus has disadvantages
in that the image forming apparatus cannot make full use
15   of such various functions of the connected
multifunctional product.

SUMMARY OF THE INVENTION

It is a general object of the present
20   invention to provide a Web service providing apparatus
in which one or more of the above-mentioned problems are
eliminated.

A more specific object of the present
invention is to provide a Web service providing
25   apparatus that can properly perform various processes,

such as a copying operation and a printing operation, on a document or an image stored in another connected apparatus through cooperation with apparatuses connected to the Web service providing apparatus via a network

5 even if a user is in front of any of the connected apparatuses and operates the apparatus.

In addition, another more specific object of the present invention is to provide a Web service providing method performed by such a Web service

10 providing apparatus.

In order to achieve the above-mentioned objects, there is provided according to one aspect of the present invention a Web service providing apparatus, including: a server processing part controlling receipt

15 of a process request to request a process from a requesting apparatus connected to the Web service providing apparatus via a communication line and transmission of a process response corresponding to the process request to the requesting apparatus in

20 accordance with a predetermined protocol; a condition acquisition control part, in response to an instruction from the server processing part, controlling acquisition of target information designated by the process request from a management apparatus managing the target

25 information based on a first processable condition under

which the target information is processable to the
management apparatus and the Web service providing
apparatus; and a service providing part performing the
requested process on the target information and sending

5   a result of the process to the server processing part.

According to one aspect of the present
invention, the above-mentioned Web service providing
apparatus can control acquisition of a first processable
condition, under which target information designated by

10   a process request can be processed by the Web service
providing apparatus and a management apparatus,
corresponding to the type of the target information.

Also, the predetermined protocol is, for
example, a Simple Object Access Protocol (SOAP).

15   In an embodiment of the present invention, the
Web service providing apparatus may further include: a
program including the condition acquisition control part
and the service providing part; a control service
managing a hardware resource used in the process; and an

20   operating system controlling the program and the control
service.

According to one aspect of the present
invention, the above-mentioned Web service providing
apparatus, which works as a computer, can directly

25   control hardware resources for image processing.

In an embodiment of the present invention, the Web service providing apparatus may further include a client processing part, in response to an instruction issued by the condition acquisition control part,

5   controlling transmission of a process request to the management apparatus and receipt of a process response from the management apparatus in accordance with the predetermined protocol.

According to one aspect of the present

10   invention, the condition acquisition control part can properly control communication of process requests and process responses through a processable condition to a management apparatus and the Web service providing apparatus.

15   In an embodiment of the present invention, the condition acquisition control part may include: a sequence control part controlling a sequence of processes to acquire a second processable condition regarding the target information from the management

20   apparatus and internally acquire a third processable condition regarding the target information in the Web service providing apparatus; and a condition determination part determining the first processable condition based on the second processable condition and

25   the third processable condition acquired by the sequence

control part.

According to one aspect of the present invention, it is possible to properly determine the first processable condition regarding the management apparatus and the Web service providing apparatus by acquiring the second and third processable conditions.

In an embodiment of the present invention, the sequence control part may include: a first control part controlling the client processing part so as to acquire the second processable condition from the management apparatus by sending a process request to request the second processable condition to the management apparatus; a second control part controlling the client processing part so as to acquire the third processable condition from the Web service providing apparatus by internally issuing a process request to request the third processable condition to the server processing part; a determination instruction part causing the condition determination part to make the determination based on the second processable condition and the third processable condition; and an information acquisition part acquiring the target information from the management apparatus in accordance with the first processable condition determined by the condition determination part.

According to one aspect of the present invention, the sequence control part acquires the second and third processable conditions regarding the management apparatus and the Web service providing apparatus, and determines the first processable condition based on the second and third processable conditions. Also, it is possible to acquire target information from the management apparatus based on the first processable condition.

In an embodiment of the present invention, the client processing part may include: a process request creation part, in response to an instruction issued by the sequence control part, creating a process request, which is to be sent to the management apparatus, corresponding to the instruction in accordance with the predetermined protocol; and a process response interpretation part interpreting a process response, which is received from the management apparatus, corresponding to the process request and informing a result of the interpretation to the sequence control part.

According to one aspect of the present invention, the sequence control part controls not only the process request creation part but also a result of the process response interpretation part.

In an embodiment of the present invention, the service providing part may include a service execution part executing a process corresponding to a process request received from the requesting apparatus or

5   internally created.

According to one aspect of the present invention, it is possible to perform a process corresponding to a process request not only received from a requesting apparatus via a network but also

10   internally issued. Thus, it is possible to perform a process corresponding to a process request created by the client process part in response to an instruction issued by the condition acquisition control part as for a process request received from a requesting apparatus.

15   In an embodiment of the present invention, the server processing part may include: a process request interpretation part interpreting the process request to request the process on the target information in accordance with the predetermined protocol; and a

20   process response creation part creating a process response to indicate a result of the process in accordance with the predetermined protocol.

According to one aspect of the present invention, since the process request interpretation part

25   interprets a process request and the process response

creation part creates a process response in accordance with a predetermined protocol such as SOAP, the above-mentioned Web service providing apparatus can work as a Web server.

5   In an embodiment of the present invention, the process request interpretation part may include: a determination part determining whether the process request is to acquire the target information from the management apparatus; and a notification part informing
10   the condition acquisition control part of the process request based on a result of the determination made by the determination part.

According to one aspect of the present invention, a process request is delivered to the
15   condition acquisition control part based on determination of the determination part. As a result, it is possible to start a sequence of processes associated with the Web service providing apparatus and the management apparatus through the condition
20   acquisition control part.

In an embodiment of the present invention, the process response creation part may include a control result creation part creating a process response to indicate a result of the control of the condition
25   acquisition control part in accordance with the

predetermined protocol.

  According to one aspect of the present invention, it is possible to send a control result of the sequence associated with the management apparatus

5 and the Web service providing apparatus to the requesting apparatus as a process response corresponding to a process request.

  In an embodiment of the present invention, the condition acquisition control part may include: an

10 attribute information acquisition part acquiring attribute information regarding the target information from the management apparatus; and a third control part causing the client processing part to internally issue the process request to request the process on the target

15 information to the client processing part based on the attribute information, wherein the service providing part executes the process requested by the requesting apparatus via the server processing part based on the attribute information.

20 According to one aspect of the present invention, it is possible to perform a process requested by the requesting apparatus based on attribute information regarding the target information.

  In an embodiment of the present invention, the

25 Web service providing apparatus may include a display

part, the display part including: a first display part displaying a list of selectable apparatuses that a user is allowed to select among apparatuses connected via the communication line; a second display part, when the user selects a desired apparatus from the list of apparatuses, displaying a list of information items managed by the management apparatus; and an apparatus determination part, when the user designates a desired information item from the list of information items and the desired apparatus from the list of selectable apparatuses, determining the designated apparatus as a processing apparatus to perform the process.

In an embodiment of the present invention, the second display part may display the information items in a reduced size on the display part.

According to one aspect of the present invention, a user can determine which apparatus should perform a process on which information item by dragging and dropping operations.

In an embodiment of the present invention, the requesting apparatus may be one of the Web service providing apparatus, the management apparatus and a terminal connected to each other via the communication line.

According to one aspect of the present

invention, even if the requesting apparatus is any of the Web service providing apparatus, the management apparatus and the terminal, it is possible to acquire target information stored in another apparatus in

5 cooperation with associated apparatuses connected via a network and copy or print the target information in the requesting apparatus.

In an embodiment of the present invention, the communication line may be one of a network communication

10 line including a wireless LAN, a serial communication line including an infrared communication, and a parallel communication line.

In an embodiment of the present invention, the predetermined protocol may be a Simple Object Access

15 Protocol.

Additionally, there is provided according to another aspect of the present invention a method of providing a Web service for a Web service providing apparatus, the method including: a server processing

20 step of controlling receipt of a process request to request a process from a requesting apparatus connected to the Web service providing apparatus via a communication line and transmission of a process response corresponding to the process request to the

25 requesting apparatus in accordance with a predetermined

protocol; a condition acquisition control step of controlling, corresponding to an instruction from the server processing step, acquisition of target information designated by the process request from a

5 management apparatus managing the target information based on a first processable condition under which the target information is processable to the management apparatus and the Web service providing apparatus; and a service providing step of performing the requested

10 process on the target information and informing the server processing step of a result of the process.

Additionally, there is provided according to another aspect of the present invention a Web service providing apparatus, including: a service providing part

15 managing target information and providing the target information to a processing apparatus, which performs a process on the target information, in accordance with a first processable condition received from the processing apparatus; a process request interpretation part

20 interpreting a process request to request the process in accordance with a predetermined portocol and informing the service providing part of the process; and a process request creation part creating a process response to indicate a result of the process in accordance with the

25 predetermined protocol.

In an embodiment of the present invention, the service providing part may include a processable condition providing part, in response to receipt of a process request to acquire a second processable

5   condition with respect to the processing apparatus, sending a process response to indicate the second processable condition in accordance with the predetermined protocol, and after the transmission of the process response to indicate the second processable

10   condition, the service providing part may provide the target information to the processing apparatus in accordance with the first processable condition received from the processing apparatus.

In an embodiment of the present invention, the

15   Web service providing apparatus may further include: a process request creation part creating the process request to request the process in accordance with the predetermined protocol; and a process response interpretation part interpreting the received process

20   response corresponding to the process request.

In an embodiment of the present invention, the Web service providing apparatus may further include a display part, the display part including: a first display part displaying a list of selectable apparatuses

25   that a user is allowed to select among apparatuses

connected via a communication line; a second display

part, when the user selects a desired apparatus from the

list of selectable apparatuses, displaying a list of

information items managed by the selected apparatus; and

5 an apparatus determination part, when the user

designates a desired information item from the list of

information items and the desired apparatus from the

list of selectable apparatuses, determining the

designated apparatus as the processing apparatus.

10 Additionally, there is provided according to

another aspect of the present invention a method of

providing a Web service for a Web service providing

apparatus, the method including: a service providing

step of managing target information and providing the

15 target information to a processing apparatus to perform

a process on the target information based on a first

processable condition received from the processing

apparatus; a process request interpretation step of

interpreting a process request to request the process in

20 accordance with a predetermined protocol and informing

the service providing step of the process; and a process

request creation step of creating a process response to

indicate a result of the process in accordance with the

predetermined protocol.

25 Additionally, there is provided according to

another aspect of the present invention a terminal,
including: a process request creation part creating a
process request to cause a first apparatus to acquire
target information managed by a second apparatus from

5 the second apparatus and perform a process on the target
information in accordance with a predetermined protocol;
a process response interpretation part interpreting a
process response corresponding to the process request
and acquiring a result of the process performed by the

10 first apparatus; and a display control part displaying
the result of the process on a display unit of the
terminal.

Additionally, there is provided according to
another aspect of the present invention a recording

15 medium for storing a program to cause a terminal to
execute a procedure, the procedure including: a process
request creation step of creating a process request to
request a first apparatus to acquire target information
managed by a second apparatus from the second apparatus

20 and perform a process on the target information in
accordance with a predetermined protocol; a process
response interpretation step of interpreting a process
response corresponding to the process request and
acquiring a result of the process of the first

25 apparatus; and a display control step of displaying the

result of the process on a display unit of the terminal.

Additionally, there is provided according to another aspect of the present invention a program to cause a terminal to execute a procedure, the procedure including: a process request creation step of creating a process request to request a first apparatus to acquire target information managed by a second apparatus from the second apparatus and perform a process on the target information in accordance with a predetermined protocol; a process response interpretation step of interpreting a process response corresponding to the process request and acquiring a result of the process of the first apparatus; and a display control step of displaying the result of the process on a display unit of the terminal.

According to one aspect of the present invention, it is possible to perform some process, such as printing and copying operations, on a target document, which is stored in a document transmitter apparatus, in a document receiver apparatus based on a processable document type in cooperation with the document transmitter apparatus and the document receiver apparatuses.

Additionally, there is provided according to another aspect of the present invention a Web service providing apparatus, including: a server processing part

controlling receipt of a process request to request a
process from a requesting apparatus connected to the Web
service providing apparatus via a communication line and
transmission of a process response corresponding to the
5   process request to the requesting apparatus in
accordance with a predetermined protocol; a condition
acquisition control part, in response to an instruction
from the server processing part, controlling
transmission of target information designated by the
10   process request to a processing apparatus based on a
first processable condition under which the target
information is processable to the processing apparatus
and the Web service providing apparatus; and a service
providing part, in response to receipt of a result of
15   the process performed by the processing apparatus on the
target information, informing the server processing part
of the result of the process.

According to one aspect of the present
invention, the above-mentioned Web service providing
20   apparatus can control acquisition of a first processable
condition, under which target information designated by
a process request can be processed by the Web service
providing apparatus and a management apparatus,
corresponding to the type of the target information.

25   Also, the predetermined protocol is, for

example, a Simple Object Access Protocol (SOAP).

In an embodiment of the present invention, the Web service providing apparatus may further include: a program including the condition acquisition control part and the service providing part; a control service managing a hardware resource used in the process; and an operating system controlling the program and the control service.

According to one aspect of the present invention, the above-mentioned Web service providing apparatus, which works as a computer, can directly control hardware resources for image processing.

In an embodiment of the present invention, the Web service providing apparatus may further include a client processing part, in response to an instruction issued by the condition acquisition control part, controlling transmission of a process request to the processing apparatus and receipt of a process response from the processing apparatus in accordance with the predetermined protocol.

According to one aspect of the present invention, the condition acquisition control part can properly control communication of process requests and process responses through a processable condition to a processing apparatus and the Web service providing

apparatus.

In an embodiment of the present invention, the condition acquisition control part may include: a sequence control part controlling a sequence of

5   processes to acquire a second processable condition regarding the target information from the processing apparatus and internally acquire a third processable condition regarding the target information from the Web service providing apparatus; and a condition

10   determination part determining the first processable condition based on the second processable condition and the third processable condition acquired by the sequence control part.

According to one aspect of the present

15   invention, it is possible to properly determine the first processable condition regarding the processing apparatus and the Web service providing apparatus by acquiring the second and third processable conditions.

In an embodiment of the present invention, the

20   sequence control part may include: a first control part controlling the client processing part so as to acquire the second processable condition from the processing apparatus by sending a process request to request the second processable condition to the processing

25   apparatus; a second control part controlling the client

processing part so as to acquire the third processable
condition from the Web service providing apparatus by
internally issuing a process request to request the
third processable condition to the server processing

5   part; a determination instruction part causing the
condition determination part to make the determination
based on the second processable condition and the third
processable condition; and an information transmission
part sending the target information to the processing

10   apparatus in accordance with the first processable
condition determined by the condition determination part.

According to one aspect of the present
invention, the sequence control part acquires the second
and third processable conditions regarding the

15   management apparatus and the Web service providing
apparatus, respectively, and determines the first
processable condition based on the second and third
processable conditions. Also, the processing apparatus
can acquire target information based on the first

20   processable condition.

In an embodiment of the present invention, the
client processing part may include: a process request
creation part, in response to an instruction issued by
the sequence control part, creating a process request,

25   which is sent to the processing apparatus, corresponding

to the instruction in accordance with the predetermined protocol; and a process response interpretation part interpreting a process response, which is received from the processing apparatus, corresponding to the process

5   request and informing a result of the interpretation of the sequence control part.

According to one aspect of the present invention, the sequence control part controls not only the process request creation part but also a result of

10   the process response interpretation part.

In an embodiment of the present invention, the service providing part may include a service execution part executing a process corresponding to a process request received from the requesting apparatus or

15   internally created.

According to one aspect of the present invention, it is possible to perform a process corresponding to a process request not only received from a requesting apparatus via a network but also

20   internally issued. Thus, it is possible to perform a process corresponding to a process request created by the client process part in response to an instruction issued by the condition acquisition control part as for a process request received from a requesting apparatus.

25   In an embodiment of the present invention, the

server processing part may include: a process request
interpretation part interpreting the process request to
request the process on the target information in
accordance with the predetermined protocol; and a

5   process response creation part creating a process
response to indicate a result of the process in
accordance with the predetermined protocol.

According to one aspect of the present
invention, since the process request interpretation part

10   interprets a process request and the process response
creation part creates a process response in accordance
with a predetermined protocol such as SOAP, the above-
mentioned Web service providing apparatus can work as a
Web server.

15   In an embodiment of the present invention, the
process request interpretation part may include: a
determination part determining whether the process
request is to send the target information to the
processing apparatus; and a notification part informing

20   the condition acquisition control part of the process
request based on a result of the determination made by
the determination part.

According to one aspect of the present
invention, a process request is delivered to the

25   condition acquisition control part based on

determination of the determination part. As a result,
it is possible to start a sequence of processes
associated with the Web service providing apparatus and
the management apparatus through the condition
5   acquisition control part.

In an embodiment of the present invention, the
process response creation part may include a control
result creation part creating a process response to
indicate a result of the control of the condition
10   acquisition control part in accordance with the
predetermined protocol.

According to one aspect of the present
invention, it is possible to send a control result of
the sequence associated with the processing apparatus
15   and the Web service providing apparatus to the
requesting apparatus as a process response corresponding
to a process request.

In an embodiment of the present invention, the
Web service providing apparatus may further include a
20   display part, the display part including: a first
display part displaying a list of selectable apparatuses
that a user is allowed to select among apparatuses
connected via a communication line; a second display
part, when the user selects a desired apparatus from the
25   list of selectable apparatuses, displaying a list of

information items managed by the selected apparatus on the display part; and an apparatus determination part, when the user designates a desired information item from the list of information items and the desired apparatus

5 from the list of selectable apparatuses, determining the designated apparatus as a processing apparatus.

In an embodiment of the present invention, the second display part may display the information items in a reduced size on the display part.

10 According to one aspect of the present invention, a user can determine which apparatus should perform a process on which information item by dragging and dropping operations.

In an embodiment of the present invention, the

15 requesting apparatus may be one of the Web service providing apparatus, the processing apparatus, and a terminal connected to each other via the communication line.

According to one aspect of the present

20 invention, even if the requesting apparatus is any of the Web service providing apparatus, the management apparatus and the terminal, it is possible to acquire target information stored in management apparatus in cooperation with associated apparatuses connected via a

25 network and copy or print the target information in the

requesting apparatus.

In an embodiment of the present invention, the communication line may be one of a network communication line including a wireless LAN, a serial communication line including an infrared communication, and a parallel communication line.

In an embodiment of the present invention, the predetermined protocol may be a Simple Object Access Protocol.

Additionally, there is provided according to another aspect of the present invention a method of providing a Web service for a Web service providing apparatus, including: a server processing step of controlling receipt of a process request to request a process from a requesting apparatus connected to the Web service providing apparatus via a communication line and transmission of a process response corresponding to the process request to the requesting apparatus in accordance with a predetermined protocol; a condition acquisition control step of controlling, corresponding to an instruction from the server processing step, transmission of target information designated by the process request to a processing apparatus processing the target information based on a first processable condition under which the target information is

processable to the processing apparatus and the Web

service providing apparatus; and a service providing

step of performing the requested process on the target

information and informing the server processing step of

5   a result of the process.

Additionally, there is provided according to

another aspect of the preset invention a Web service

providing apparatus, including: a service providing part

performing a process on target information received from

10   a management apparatus managing the target information

in accordance with a first processable condition and

providing a result of the process to the management

apparatus; a process request interpretation part

interpreting a process request to request the process in

15   accordance with a predetermined protocol and informing

the service providing part of the process; and a process

request creation part creating a process response to

indicate a result of the process in accordance with the

predetermined protocol.

20   In an embodiment of the present invention, the

service providing part may include a processable

condition providing part, in response to receipt of a

process request to acquire a second processable

condition with respect to the management apparatus,

25   sending a process response to indicate the second

processable condition in accordance with the predetermined protocol, and after the transmission of the second processable condition, the service providing part provides a result of the process on the target

5   information received from the management apparatus in accordance with the first processable condition.

In an embodiment of the present invention, the Web service providing apparatus may further include: a process request creation part creating the process

10   request to request the process in accordance with the predetermined protocol; and a process response interpretation part interpreting the received process response corresponding to the process request.

In an embodiment of the present invention, the

15   Web service providing apparatus may further include a display part, the display part including: a first display part displaying a list of selectable apparatuses that a user is allowed to select among apparatuses connected via the communication line; a second display

20   part, when the user selects a desired apparatus from the list of selectable apparatuses, displaying a list of information items managed by the selected apparatus; and an apparatus determination part, when the user designates a desired information item from the list of

25   information items and the desired apparatus from the

list of selectable apparatuses, determining the
designated apparatus as a processing apparatus.

5

Additionally, there is provided according to
another aspect of the present invention a method of
providing a Web service for a Web service providing
apparatus, the method including: a service providing
step of performing a process on target information
received from a management apparatus managing the target
information in accordance with a first processable

10 condition and providing a result of the process to the
management apparatus; a process request interpretation
step of interpreting a process request to request the
process in accordance with a predetermined protocol and
informing the service providing step of the process; and

15 a process request creation step of creating a process
response to indicate a result of the process in
accordance with the predetermined protocol.

Additionally, there is provided according to
another aspect of the present invention a terminal,

20 including: a process request creation part creating a
process request to cause a first apparatus to perform a
process on target information managed by a second
apparatus by sending the target information to the first
apparatus in accordance with a predetermined protocol; a

25 process response interpretation part interpreting a

process response corresponding to the process request

and acquiring a result of the process performed by the

first apparatus; and a display control part displaying

the result of the process on a display unit of the

5   terminal.

Additionally, there is provided according to

another aspect of the present invention a recording

medium for storing a program to cause a terminal to

execute a procedure, the procedure including: a process

10   request creating step of creating a process request to

cause a first apparatus to perform a process on target

information managed by a second apparatus by sending the

target information to the first apparatus; a process

response interpretation step of interpreting a process

15   response corresponding to the process request and

acquiring a result of the process performed by the first

apparatus; and a display control step of displaying the

result of the process on a display unit of the terminal.

Additionally, there is provided according to

20   another aspect of the present invention a program to

cause a terminal to execute a procedure, the procedure

including: a process request creating step of creating a

process request to cause a first apparatus to perform a

process on target information managed by a second

25   apparatus by sending the target information to the first

apparatus; a process response interpretation step of interpreting a process response corresponding to the process request and acquiring a result of the process performed by the first apparatus; and a display control

5 step of displaying the result of the process on a display unit of the terminal..

According to one aspect of the present invention, it is possible to perform some process, such as printing and copying operations, on a target document,

10 which is stored in a document transmitter apparatus, in a document receiver apparatus based on a processable document type in cooperation with the document transmitter apparatus and the document receiver apparatuses.

15 Additionally, there is provided according to another aspect of the present invention a terminal connected to a management apparatus managing target information and a processing apparatus processing the target information via a communication line, including:

20 a client processing part controlling transmission of a process request to request a process to the management apparatus and the processing apparatus and receipt of a process response corresponding to the process request from the management apparatus and the processing

25 apparatus in accordance with a predetermined protocol;

and a process control part acquiring a first processable condition, under which the target information is processable to the processing apparatus, and controlling the client processing part so that the processing

5 apparatus is allowed to perform the process on the target information in accordance with the first processable condition.

According to one aspect of the present invention, the terminal can control cooperation to

10 perform a process on target information, which is stored in a management apparatus, in a processing apparatus via a communication line.

Also, the predetermined protocol is, for example, SOAP.

15 In an embodiment of the present invention, the process control part may include: a first sequence control part controlling a sequence of processes to acquire a second processable condition, under which the target information is acquirable from the management

20 apparatus, from the management apparatus; a second sequence control part controlling a sequence of processes to acquire a third processable condition, under which the target information is writable in the processing apparatus, from the processing apparatus; and

25 a condition determination part determining the first

processable condition based on the second processable
condition and the third processable condition.

　　　　　According to one aspect of the present
invention, it is possible to properly determine the
5　　first processable condition under which the management
apparatus and the processing apparatus can process the
target information.

　　　　　In an embodiment of the present invention, the
process control part may include a third sequence
10　　control part controlling a sequence of processes such
that the processing apparatus copies the target
information from the management apparatus to the
processing apparatus in accordance with the first
processable condition determined by the condition
15　　determination part.

　　　　　According to one aspect of the present
invention, it is possible to perform a PULL type
document copying process in such a way that the
processing apparatus copies the target information
20　　managed by the management apparatus.

　　　　　In an embodiment of the present invention, the
process control part may include a fourth sequence
control part controlling a sequence of processes such
that the management apparatus writes the target
25　　information in the processing apparatus in accordance

with the first processable condition determined by the condition determination part.

According to one aspect of the present invention, it is possible to perform a PUSH type document copying process in such a way that the management apparatus writes the target document in the processing apparatus.

In an embodiment of the present invention, the terminal may further include: a process request creation part creating a process request corresponding to a command issued by the process control part in accordance with a predetermined protocol; and a process response interpretation part interpreting a process response received from the management apparatus or the processing apparatus corresponding to a process request.

According to one aspect of the present invention, the process request creation part creates a process request under control of the process control part, and the process response interpretation part interprets a process response corresponding to a process request under control of the process control part. As a result, the terminal can send the process request to the management apparatus and the processing apparatus under control of the process control part. Thus, it is possible to control cooperation with the management

apparatus and the processing apparatus.

In an embodiment of the present invention, the terminal may further include an operation part operating the process on the target information managed by the

5   management apparatus, the process control part creates the process request by controlling the process request creation part.

According to one aspect of the present invention, it is possible to start control a sequence of

10   processes for the target information managed by the management apparatus in cooperation with the connected apparatuses corresponding to user's manipulation.

In an embodiment of the present invention, the operation part may include a display part displaying a

15   first display area and a second display area on a display unit of the terminal, the first display area where a list of apparatuses including the management apparatus and the processing apparatus is displayed, the second display area where a list of information items

20   managed by the management apparatus is displayed, and the condition acquisition control part may operate corresponding to copying manipulation or moving manipulation of the target information, which is displayed in the second display area, toward the

25   processing apparatus, which is displayed in the first

display area.

According to one aspect of the present invention, a user can request a process associated with cooperation with connected apparatuses by manipulating screens.

In an embodiment of the present invention, the operation part may include a first process designation part enabling a user to designate a type of process through copying manipulation or moving manipulation.

In an embodiment of the present invention, the operation part may further include a second process designation part enabling the user to designate a process method corresponding to the designated type of process.

According to one aspect of the present invention, a user can designate one of types of various processes such as a copying process and a printing process.

In an embodiment of the present invention, the operation part may further include a third process designation part enabling the user to designate a processing order of a plurality of information items that the user designates in the second display area.

According to one aspect of the present invention, when a user designates the process order of

selected information items such as documents, it is possible to designate the process order flexibly.

Additionally, there is provided according to another aspect of the present invention a recording
5 medium for storing a program to cause a terminal to execute a procedure wherein the terminal is connected to a management apparatus managing target information and a processing apparatus processing the target information via a communication line, the procedure including: a
10 client processing step of controlling transmission of a process request to request a process to the management apparatus and the processing apparatus and receipt of a process response corresponding to the process request from the management apparatus and the processing
15 apparatus in accordance with a predetermined protocol; and a process control step of acquiring a first processable condition, under which the target information is processable to the processing apparatus, and controlling the client processing step so that the
20 processing apparatus is allowed to perform the process on the target information in accordance with the first processable condition.

Additionally, there is provided according to another aspect of the present invention a program to
25 cause a terminal to execute a procedure wherein the

terminal is connected to a management apparatus managing

target information and a processing apparatus processing

the target information via a communication line, the

procedure including: a client processing step of

5   controlling transmission of a process request to request

a process to the management apparatus and the processing

apparatus and receipt of a process response

corresponding to the process request from the management

apparatus and the processing apparatus in accordance

10   with a predetermined protocol; and a process control

step of acquiring a first processable condition, under

which the target information is processable to the

processing apparatus, and controlling the client

processing step so that the processing apparatus is

15   allowed to perform the process on the target information

in accordance with the first processable condition.

According to one aspect of the present

invention, the terminal can operate corresponding to the

program stored in the recording medium.

20   Additionally, there is provided according to

another aspect of the present invention a Web service

providing apparatus, including: an information

management part managing target information; a condition

notification part, in response to receipt of a request

25   to acquire a second processable condition regarding on

the target information from a terminal connected to the

Web service providing apparatus via a communication line,

informing the terminal of the second processable

condition; and a service providing part, in response to

5   receipt of a request to acquire the target information

in accordance with the first processable condition,

which is within the second processable condition, from

the processing apparatus, providing the target

information, which is acquired from the information

10   management part, to the processing apparatus.

In an embodiment of the present invention, the

Web service providing apparatus may further include: a

program including the condition notification part and

the service providing part; a control service managing a

15   hardware resource used in the process; and an operating

system controlling the program and the control service.

In an embodiment of the present invention, the

Web service providing apparatus may further include: a

process request interpretation part interpreting the

20   process request to request the process in accordance

with a predetermined protocol; and a process response

creation part creating a process response to indicate a

result of the process in accordance with the

predetermined protocol.

25   In an embodiment of the present invention, the

process request interpretation part may interpret a
process request, which is received from the terminal, to
acquire a processable condition regrading the target
information, and the process response creation part may
5   create a process response to indicate the second
processable condition.

According to one aspect of the present
invention, the management apparatus can send the target
information to the processing apparatus corresponding to
10   a request to acquire the target information in
accordance with the first processable condition, which
is within the second processable condition sent to the
terminal. The management apparatus can be controlled to
send the target information to the processing apparatus
15   in accordance with the first processable condition.

Additionally, there is provided according to
another aspect of the present invention a method of
providing a Web service, the method including: an
information management step of managing target
20   information; a condition notification step, in response
to receipt of a request to acquire a second processable
condition regarding on the target information from a
terminal connected via a communication line, informing
the terminal of the second processable condition; and a
25   service providing step, in response to receipt of a

request to acquire the target information in accordance with the first processable condition, which is within the second processable condition, from the processing apparatus, providing the target information, which is

5 acquired from the information management part, to the processing apparatus.

Additionally, there is provided according to another aspect of the present invention a Web service providing apparatus, including: a condition notification

10 part, in response to receipt of a request to acquire a third processable condition regarding target information managed by a management apparatus from a terminal connected to the Web service providing apparatus via a communication line, informing the terminal of the third

15 processable condition; a process request interpretation part interpreting a process request to perform a process on the target information in accordance with a first processable condition, which is within the third processable condition received from the terminal in

20 accordance with a predetermined protocol; and a process response creation part creating a process response to indicate a result of the process in accordance with the predetermined protocol.

In an embodiment of the present invention, the

25 Web service providing apparatus may furtherincludeg: a

process request creation part creating the process
request to acquire the target information in accordance
with the first processable condition in accordance with
the predetermined protocol; and a process response
5   interpretation part interpreting the process response
indicate the target information received from the
management apparatus in accordance with the
predetermined protocol.

According to one aspect of the present
10 invention, the processing apparatus performs a process
on the target information in accordance with the first
processable condition, it is possible to provide a
process result to the terminal.

Additionally, there is provided according to
15 another aspect of the present invention a method of
providing a Web service, including: a condition
notification step, in response to receipt of a request
to acquire a third processable condition regarding
target information managed by a management apparatus
20 from a terminal connected via a communication line, of
informing the terminal of the third processable
condition; a process request interpretation step of
interpreting a process request to perform a process on
the target information in accordance with a first
25 processable condition, which is within the third

processable condition received from the terminal in

accordance with a predetermined protocol; and a process

response creation part of creating a process response to

indicate a result of the process in accordance with the

5 predetermined protocol.

According to one aspect of the present

invention, it is possible to perform some process, such

as printing and copying operations, on a target document,

which is stored in a document transmitter apparatus, in

10 a document receiver apparatus based on a processable

document type in cooperation with the document

transmitter apparatus, the document receiver apparatus

and the terminal.

Other objects, features and advantages of the

15 present invention will become more apparent from the

following detailed description when read in conjunction

with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

20   FIG. 1 is a block diagram illustrating an

exemplary functional structure of an image forming

apparatus having a plurality of image forming functions

according to the present invention;

FIG. 2 is a block diagram illustrating an

25 exemplary hardware configuration of the image forming

apparatus shown in FIG. 1;

FIG. 3 is a diagram illustrating an exemplary structure of a network system according to a first embodiment of the present invention;

5   FIG. 4 is a diagram illustrating an exemplary functional structure of an image forming apparatus having a document process control part according to the first embodiment;

FIG. 5 is a diagram illustrating an exemplary

10   functional structure of an image forming apparatus having no document process control part according to the first embodiment;

FIG. 6 is a diagram illustrating an exemplary functional structure of a terminal having no document

15   process control part according to the first embodiment;

FIG. 7 is a diagram illustrating an exemplary operation of a first document copying process for a first pattern according to the first embodiment;

FIG. 8 is a diagram illustrating an exemplary

20   operation of a second document copying process for a second pattern according to the first embodiment;

FIG. 9 is a diagram illustrating an exemplary operation of a third document copying process for a third pattern according to the first embodiment;

25   FIG. 10 is a diagram illustrating an exemplary

HTTP request for a document copying request command using a ticket according to the first embodiment;

FIG. 11 is a diagram illustrating an exemplary HTTP response corresponding to the document copying

5   request command using a ticket according to the first embodiment;

FIG. 12 is a diagram illustrating an exemplary HTTP request for an acquirable document type list request command according to the first embodiment;

10   FIG. 13 is a diagram illustrating an exemplary HTTP response corresponding to the acquirable document type list request command according to the first embodiment;

FIG. 14 is a diagram illustrating an exemplary

15   HTTP request for a page image request command according to the first embodiment;

FIG. 15 is a diagram illustrating an exemplary HTTP response corresponding to the page image request command according to the first embodiment;

20   FIG. 16 is a diagram illustrating an exemplary copying manipulation screen according to the first embodiment;

FIG. 17 is a diagram illustrating an exemplary copying confirmation dialog according to the first

25   embodiment;

FIG. 18 is a diagram illustrating an exemplary plural document copying mode setting dialog according to the first embodiment;

FIG. 19 is a diagram illustrating an exemplary
5 plural document copying order setting dialog according to the first embodiment;

FIG. 20 is an exemplary functional structure of a network system according to a second embodiment of the present invention;

10 FIG. 21 is a diagram illustrating an exemplary functional structure of an image forming apparatus having a document process control part according to the second embodiment;

FIG. 22 is a diagram illustrating an exemplary
15 operation of a first document printing process for a first pattern according to the second embodiment;

FIG. 23 is a diagram illustrating an exemplary operation of a second document printing process for a second pattern according to the second embodiment;

20 FIG. 24 is a diagram illustrating an exemplary operation of a third document printing process for a third pattern according to the second embodiment;

FIG. 25 is a diagram illustrating an exemplary copying or printing confirmation dialog according to the
25 second embodiment;

FIG. 26 is a diagram illustrating an exemplary printing process detail setting dialog according to the second embodiment;

FIG. 27 is a diagram illustrating an exemplary
5 structure of a network system according to a third embodiment of the present invention;

FIG. 28 is a diagram illustrating an exemplary operation of a first document copying process for a first pattern according to the third embodiment;

10 FIG. 29 is a diagram illustrating an exemplary operation of a second document copying process for a second pattern according to the third embodiment;

FIG. 30 is a diagram illustrating an exemplary operation of a third document copying process for a
15 third pattern according to the third embodiment;

FIG. 31 is a diagram illustrating an exemplary HTTP request for a document writing request command using a ticket according to the third embodiment;

FIG. 32 is a diagram illustrating an exemplary
20 HTTP response corresponding to the document writing request command according to the third embodiment;

FIG. 33 is a diagram illustrating an exemplary HTTP request for a writable document type list request command according to the third embodiment;

25 FIG. 34 is a diagram illustrating an exemplary

HTTP response corresponding to the writable document type list request command according to the third embodiment;

FIG. 35 is a diagram illustrating an exemplary HTTP request for a page image writing request command according to the third embodiment;

FIG. 36 is a diagram illustrating an exemplary HTTP response corresponding to the page image writing request command according to the third embodiment;

FIG. 37 is a diagram illustrating an exemplary copying manipulation screen according to the third embodiment;

FIG. 38 is a diagram illustrating an exemplary copying confirmation dialog according to the third embodiment;

FIG. 39 is a diagram illustrating an exemplary plural document copying mode setting dialog according to the third embodiment;

FIG. 40 is a diagram illustrating an exemplary plural document copying order setting dialog according to the third embodiment;

FIG. 41 is a diagram illustrating an exemplary structure of a network system according to a fourth embodiment of the present invention;

FIG. 42 is an exemplary functional structures

of two image forming apparatuses having no document process control part according to the fourth embodiment;

FIG. 43 is a diagram illustrating an exemplary functional structure of a terminal having a document process control part according to the fourth embodiment;

FIG. 44 is a diagram illustrating an exemplary operation of a PULL type document copying process according to the fourth embodiment;

FIG. 45 is a diagram illustrating an exemplary HTTP request for an acquirable document type list request command according to the fourth embodiment;

FIG. 46 is a diagram illustrating an exemplary HTTP response corresponding to the acquirable document type list request command according to the fourth embodiment;

FIG. 47 is a diagram illustrating an exemplary HTTP request for a document copying request command according to the fourth embodiment;

FIG. 48 is a diagram illustrating an exemplary HTTP response corresponding to the document copying request command according to the fourth embodiment;

FIG. 49 is a diagram illustrating an exemplary HTTP request for a page image request command according to the fourth embodiment;

FIG. 50 is a diagram illustrating an exemplary

HTTP response corresponding to the page image request command according to the fourth embodiment;

FIG. 51 is a diagram illustrating an exemplary operation of a PUSH type document copying process according to the fourth embodiment;

FIG. 52 is a diagram illustrating an exemplary HTTP request for a page image writing request command according to the fourth embodiment;

FIG. 53 is a diagram illustrating an exemplary HTTP response for the page image writing request command according to the fourth embodiment;

FIG. 54 is a diagram illustrating an exemplary structure of a network system according to a fifth embodiment of the present invention;

FIG. 55 is a diagram illustrating an exemplary functional structure of an image forming apparatus according to the fifth embodiment; and

FIG. 56 is a diagram illustrating an exemplary operation of a PULL type document printing sequence according to the fifth embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following, embodiments of the present invention will be described with reference to the accompanying drawings.

A description is given, with reference to FIG. 1 through FIG. 19, of an image forming apparatus having a plurality of image forming functions according to a first embodiment of the present invention.

5   First, an exemplary functional structure of an image forming apparatus according to the first embodiment is described with reference to FIG. 1.

FIG. 1 is a block diagram illustrating an exemplary functional structure of an image forming

10   apparatus 1200 having a plurality of image forming functions according to the first embodiment.

Referring to FIG. 1, the image forming apparatus 1200 comprises a plotter 1201, a scanner 1202, other hardware resources 1203, an engine interface 1204,

15   a software set 1210 and an activation part 1240. The plotter 1201 and the scanner 1202 are hardware resources to perform printing processes and scanning processes, respectively. The software set 1210 comprises a platform 1220 and an application set 1230.

20   When the image forming apparatus 1200 is powered ON, the activation part 1240 first activates the platform 1220, the application set 1230 and other components.

The software set 1210 further includes an

25   application program interface (API) 1205 serving as an

interface between the application set 1230 and the
platform 1220. The platform 1220 comprises a control
service 1250, a system resource manager (SRM) 1223 and
an operating system (OS) 1221. The control service 1250,

5   in response to receipt of a process request from the
application set 1230 via API 1205, interprets the
process request and then requests a hardware item
corresponding to the process request. SRM 1223 manages
one or more hardware items in order to arrange the

10   request issued by the control service 1250.

The control service 1250 comprises a plurality
of service modules as illustrated in FIG. 1.
Specifically, the control service 1250 comprises a
system control service (SCS) 1222, an engine control

15   service (ECS) 1224, a memory control service (MCS) 1225,
an operation panel control service (OCS) 1226, a FAX
control service (FCS) 1227, a network control service
(NCS) 1228 and an imaging memory handler (IMH) 1229.

OS 1221, which is implemented by one of

20   operating systems such as UNIX®, executes individual
software items of the platform 1220. OS 1221 can
execute individual applications of the application set
1230 as separate processes in parallel. If the image
forming apparatus 1200 uses the open source UNIX® as OS

25   1221, it is possible to assure safety of programs in the

image forming apparatus 1200. In addition, since the image forming apparatus 1200 can be connected to a network, it is possible to acquire a new source code of UNIX®, for example, when there occurs a significant

5   change on an original source code, through the network without difficulty. Furthermore, it is unnecessary to pay royalties for UNIX®-based OS and TCP/IP. For this reason, UNIX®-based image forming apparatuses can be easily outsourced. In addition, UNIX®-based OS 1221

10   differs from operating systems installed in personal computers (PC) with respect to management mechanisms of hardware resources to process images. In detail, UNIX®-based OS 1221 is capable of directly controlling hardware items in the image forming apparatus. On the

15   other hand, although PC is capable of controlling connected image forming devices such as a scanner and a printer, PC cannot directly control hardware resources installed in such image forming devices.

SRM 1223, together with SCS 1222, performs

20   system control and resource management on the image forming apparatus 1200. When SRM 1223 receives requests to use the plotter 1201, the scanner 1202, a memory, a hard disk (HDD), and a host I/O device such as centronics I/F, a network I/F, an IEEE1394 I/F, an RS232

25   I/F from upper components thereof, SRM 1223 arranges

hardware resources and controls execution of the
hardware resources corresponding to these requests.

Specifically, SRM 1223 determines whether or
not a requested hardware item is currently available,
5   that is, whether or not the requested hardware item is
not being used for another request. If the requested
hardware item is determined to be currently available,
SRM 1223 informs the upper component issuing the request
that the requested hardware item is currently available.
10   Alternatively, when SRM 1223 receives requests, such as
paper feeding, image forming, memory reservation, file
creation, from an upper component thereof, SRM 1223 may
make an utilization schedule of requested hardware
resources and directly fulfill the requests by itself.

15   SCS 1222 can perform a plurality of functions
such as an application management function (Function #1),
an operation part control function (Function #2), a
system screen display function (Function #3), an LED
(Light Emitting Diode) display function (Function #4), a
20   resource management function (Function #5) and an
interrupt application control function (Function #6).

Specifically, the application management
function (Function #1) informs existing applications of
both registration of a new application and information
25   regarding the newly registered application. The

operation part control function (Function #2) provides

an application with authorization on exclusive use of

the operation part. The system screen display part

(Function #3), in response to receipt of a request from

5   such an authorized application, displays various types

of alarm screens corresponding to the current status of

the engine part. The LED display function (Function #4)

controls displaying on system LED tools such as an alarm

LED and an application key. The resource management

10   function (Function #5) arranges occupation of

exclusively used engine resources (a scanner, a stapling

tool and so on) during execution of an application's job.

The interrupt application control function (Function #6)

assigns higher priority to execution of a certain

15   application.

ECS 1224 controls the engine part comprising

the plotter 1201, the scanner 1202 and other resources

1203. Specifically, ECS 1224 reads an image, prints out

an image, informs the current status of the image

20   forming apparatus, recovers jam trouble, and so on.

MCS 1225 controls memories. Specifically, MCS

1225 acquires and releases a memory area for an image,

utilizes a hard disk device, and compresses/decompresses

image data.

25   OCS 1226 controls an operation panel that

works as communication means for communicating

information between a user and the system controller of

the image forming apparatus 1200. Specifically, OCS

1226 informs the system controller of a key manipulation

5   event given by the user, offers library functions

whereby each application can construct GUI (Graphical

User Interface), manages constructed GUI information for

individual applications, and displays the latest

information on the operation panel.

10   FCS 1227 offers API 1205 to transmit and

receive data to/from applications by means of a

facsimile via PSTN/ISDN (Public Switched Telephone

Network/Integrated Services Digital Network), to

register/cite various types of FAX data managed by a

15   backup SRAM (BKM), to read FAX data, to print out

received FAX data, and to provide a multiple FAX

transmission scheme where an Internet FAX or the like

can be selectively used.

           NCS 1228 offers services commonly available to

20   applications that need a network I/O. Specifically, NCS

1228 distributes data received from the network side in

accordance with individual protocols to the

corresponding applications. In addition, when the

applications send data to the network side, NCS 1228

25   acts as an intermediary agent between applications and

the network side. NCS 1228 at least includes a httpd
(Hypertext Transfer Protocol Daemon) 2 to control
communications between the image processing apparatus
1200, a usbd (Universal Serial Bus Daemon) 2-1 to

5   control communication via USB (Universal Serial Bus)
connection, 1349d (Daemon) 2-2 to control communication
via IEEE1349s, a centrod (Centronics Daemon) 2-3 to
control communication via centronic connection, a brts
(Bluetooth Daemon) 2-4 to control communication via

10   bluetooth connection, an ird (Infrared Daemon) 2-5 to
control infrared communication, a scsid (SCSI Daemon) 2-
6 to control communication via SCSI connection, and
external apparatuses connected via networks and a ftpd
(File Transfer Protocol Daemon) 3.

15   IMH 1229 maps image data from a virtual memory
area to a physical memory area. Specifically, IMH 1229
provides a system call in response to starting of a
process, maps a virtual memory area for the process, and
releases the mapped virtual memory area in response to

20   termination of the process.

             The application set 1230 comprises a printer
application 1211, a copy application 1212, a FAX
application 1213, a scanner application 1214, a network
file application 1215, a document management Web service

25   application 1216 and a ticket management Web service

application 1217. The printer application 1211 is for a

printer having PDL (Page Description Language), PCL

(Printer Control Language) and PS (PostScript), as

appreciated by those skilled in the art. The copy

5   application 1212, the FAX application 1213, the scanner

application 1214 and the network file application 1215

are for a copier, a facsimile, a scanner and a network

file, respectively. The document management Web service

application 1216 includes a document process control

10   part 300 to control a sequence of processes for

performing cooperation with other apparatuses. The

ticket management Web service application 1217 issues

and manages a ticket for each document process. The

entities of these applications 1211 through 1217 are

15   screen display control programs to control a screen and

keys and to create jobs through execution of processes

on the platform 1220. Here, a new application may be

installed via a network connected to NCS 1228. Also,

such applications installed in the image forming

20   apparatus 1200 can be separately added or deleted.

In the image forming apparatus 1200, the

platform 1220 is responsible to collectively control

processes commonly performed for the applications as

described above.

25   A description is given, with reference to FIG.

2, of a hardware configuration of the image forming apparatus 1200 according to the present invention.

FIG. 2 is a block diagram illustrating an exemplary hardware configuration of the image forming

5   apparatus 1200 shown in FIG. 1.

Referring to FIG. 2, the image forming apparatus 1200 comprises a controller 1300, an operation panel 1310, and an engine part 1350. The engine part 1350 comprises a FCU (FAX control Unit) 1320, a plotter

10   1201, a scanner 1202, and other hardware resources 1203. In the image forming apparatus 1200, these individual components of the engine part 1350 and ASIC (Application Specific Integrated Circuit) 1301 of the controller 1300 are connected to each other via a PCI (Peripheral

15   Component Interconnect) bus 1309.

FCU 1320 comprises a nonvolatile memory (NVM) 1321 to store received fax data, and RTC (Real Time Clock) to measure time within FCU 1320. FCU 1320 transmits and receives fax data in accordance with G3

20   standard, as appreciated by those skilled in the art. FCU 1320 may further include a G3 option and a G4 option.

The controller 1300 comprises ASIC 1301, MEM-C 1302, HDD (Hard Disk Drive) 1303, CPU (Central Processing Unit) 1304, NB (North Bridge) 1305, MEM-P

25   1306, SB (South Bridge) 1307 and AGP (Accelerated

Graphics Port) 1308, each of which will be well-known by those skilled in the art, as illustrated in FIG. 2.

In the controller 1300, MEM-C 1302 and HDD 1303 are connected to ASIC 1301, and ASIC 1301 is

5   connected to CPU 1304 via NB 1305 of a CPU chip set. NB 1305 is used because any interface of CPU 1304 is not disclosed.

ASIC 1301 and NB 1305 are connected via not PCI 1309 but AGP 1308. AGP 1308 is intended to prevent

10   performance reduction. Since the image forming apparatus 1200 executes and controls a plurality of processes for the platform 1220 and the application set 1230 as illustrated in FIG. 1, there is a risk that the performance of the image forming apparatus 1200 may be

15   lowered due to use of low-speed PCI.

CPU 1304 controls overall operations of the image forming apparatus 1200. Specifically, CPU 1304 executes SCS 1222, SRM 1223, ECS 1224, MCS 1225, OCS 1226, FCS 1227 and NCS 1228, which constitutes the

20   platform 1220, as individual processes on OS 1221. Also, CPU 1304 executes the printer application 1211, the copier application 1212, the FAX application 1213, the scanner application 1214, the network file application 1215, the document management Web service application

25   1216 and the ticket management Web service application

1217, which constitute the application set 1230.

NB 1305 serves as a bridge to connect between CPU 1304 and each component of MEM-P 1306, SB 1307 and ASIC 1301. MEM-P 1306 is a system memory used as

5 graphic memory of the image forming apparatus 1200. MEM-C 1302 is a local memory used as a copier image buffer and a code buffer. ASIC 1301 is an IC (Integrated Circuit) dedicated to image processing having image forming hardware components.

10 SB 1307 serves as a bridge to connect between NB 1305 and ROM (Read Only Memory), PCI devices and peripheral devices (not illustrated). SB 1307 comprises RTC (Real Time Clock) 1323 to measure time within the controller 1300. Furthermore, SB 1307 comprises a USB

15 host. In this case, image data can be imported by connecting to a camera via a USB. Also, data can be received from another USB target.

In the image forming apparatus 1200, data that are transmitted and received via the ports of SB 1307,

20 NIC 1311, a USB target 1312, IEEE1394, a centronics 1314, a serial 1315, a USB host 1316, FCU standard G3, a G3 option, and a G4 option are stored in HDD 1303 and comprehensively managed therein. HDD 1303 is used as storage means for storing image data, programs, font

25 data and form data.

The operation panel 1310 accepts an input manipulated by an operator and shows an operator some information.

ASIC 1301 includes RAM (Random Access Memory)
5   interface with MEM-C 1302 and a hard disk interface with HDD 1303. When image data are input/output in/from these storage means, the image data are transmitted/received via the RAM interface or the hard disk interface.

10   AGP 1308 serves as a bus interface for a graphics accelerator card proposed to improve the speed of graphic processing. AGP 1308 realizes a high-speed graphics accelerator card by directly accessing a system memory at a high throughput.

15   A description is given, with reference to the FIG. 3 through FIG. 19, of a copying process performed by the image forming apparatus 1200 according to a first embodiment of the present invention. In the first embodiment, the image forming apparatus 1200 performs
20   the copying process, which is an embodiment of a Web service, on document data or image data in cooperation with other apparatuses connected via a network. Here, a Web service means that the image forming apparatus 1200 according to the first embodiment, in response to
25   receipt of a service request in the form of an HTTP

request from other apparatuses connected via a network, performs a process corresponding to the service request and provides the process result as an HTTP response to the apparatus requesting the service.

5   A description is given, with reference to FIG. 3, of how the image forming apparatus 1200 according to the first embodiment provides a Web service to other apparatuses connected via a network.

FIG. 3 shows an exemplary structure of a

10   network system according to the first embodiment. In the illustrated network system, the image forming apparatus 1200, an image forming apparatus 1000 having the fundamentally same functions as the image forming apparatus 1200, and a terminal 30 are connected to each

15   other via a network 15. The image forming apparatus 1000 does not have to include the document process control part 300 in the document management Web service application 1216 shown in FIG. 1.

Referring to FIG. 3, document data or image

20   data (hereinafter which are collectively referred to as a document) stored in HDD 1303B of the image forming apparatus 1000 are copied to the image forming apparatus 1200 in accordance with illustrated three patterns. In this embodiment, the image forming apparatus 1000, which

25   serves as a document transmitter apparatus, sends a

document stored therein to the image forming apparatus 1200. On the other hand, the image forming apparatus 1200, which serves as a document receiver apparatus, receives the document from the image forming apparatus

5   1000, and the document is copied to the image forming apparatus 1200 by storing the document in HDD 1303 of the image forming apparatus 1200.

In the first pattern, a document stored in the image forming apparatus 1000 is copied to the image

10 forming apparatus 1200 through user's manipulation on an operation panel 1310 of the image forming apparatus 1200. In the second pattern, a document stored in the image forming apparatus 1000 is copied to the image forming apparatus 1200 through user's manipulation on an

15 operation panel 1310B of the image forming apparatus 1000. In the third pattern, a document stored in the image forming apparatus 1000 is copied to the image forming apparatus 1200 through user's manipulation on a display part 13 of the terminal 30.

20   A description is given, with reference to FIG. 4 through FIG. 6, of functional structures of the image forming apparatuses 1000 and 1200 and the terminal 30.

FIG. 4 shows an exemplary functional structure of the image forming apparatus 1200 having the document

25 process control part 300 according to the first

embodiment wherein only primary functional components of the image forming apparatus 1200 are illustrated and the other functional components are omitted.

Referring to FIG. 4, the document management
5   Web service application 1216 of the image forming apparatus 1200 comprises a server part 100, a document management Web service execution part (WSF) 130, a client part 200 and a document process control part 300.

The server part 100 controls message exchanges
10 in accordance with SOAP. The document management Web service execution part 130, which serves as a Web service function (WSF) to provide Web services, manages documents by accessing HDD 1303 accommodating the documents. The client part 200 exchanges SOAP messages
15 to request and provide Web services. The document process control part 300, when the client part 200 performs some process on a document in response to notification from the server part 100, controls a sequence of processes associated with cooperation with
20 other connected apparatuses.

The server part 100 comprises a SOAP command analysis part 110 and a SOAP response creation part 120. The SOAP command analysis part 110 analyzes SOAP commands incorporated in HTTP requests. The SOAP
25 response creation part 120 creates responses

corresponding to the SOAP commands as SOAP messages incorporated in HTTP responses.

When the image forming apparatus 1200 receives an HTTP request, the SOAP command analysis part 110

5 analyzes a SOAP command incorporated in the HTTP request, and informs the document management Web service execution part 130 what Web service the document management Web service execution part 130 should execute. In response to receipt of the notification from the SOAP

10 command analysis part 110, for example, the document management Web service execution part 130 stores a processed document in HDD 1303, updates and deletes a document stored in HDD 1303, and acquires bibliographic information regarding a document stored in HDD 1303.

15 The SOAP command analysis part 110 includes a SOAP command determination part 111. The SOAP command determination part 111 extracts a SOAP command from a received HTTP request, and then determines whether the SOAP command is for execution of a predetermined process

20 in cooperation with other apparatuses connected to the image forming apparatus 1200 via the network 15. In such a SOAP command, for example, the image forming apparatus 1200 may be requested to receive a document to be processed from the image forming apparatus 1000 and

25 perform a predetermined process on the document. If the

extracted SOAP command is associated with cooperation with other connected apparatuses, the SOAP command determination part 111 informs a sequence control part 310, which is a component of the document process

5   control part 300, of the SOAP command. In the first embodiment, the SOAP command determination part 111 determines whether a SOAP command incorporated in a received HTTP request is a document copying request command to copy a selected document from the image

10   forming apparatus 1000 to the image forming apparatus 1200.

The SOAP response creation part 120, when the SOAP command analysis part 110 requests the document management Web service execution part 130 to process a

15   document, receives a process result of the document management Web service execution part 130, creates a SOAP message to indicate the process result, and uses httpd 2 of NCS 1228 to send the SOAP message as an HTTP response to the network 15. Also, the SOAP response

20   creation part 120 creates a SOAP message corresponding to a process result informed by the sequence control part 310 of the document process control part 300.

The client part 200 comprises a SOAP command creation part 210 and a SOAP response interpretation

25   part 220. The SOAP command creation part 210 creates

SOAP messages indicative of process requests in such a way that the SOAP messages are incorporated in HTTP requests. The SOAP response interpretation part 220 interprets SOAP messages incorporated in received HTTP
5   responses.

The document process control part 300 comprises a sequence control part 310 and a document type determination part 320. The sequence control part 310 controls a sequence of processes to copy a document
10   stored in the image forming apparatus 1000 to the image forming apparatus 1200 in cooperation with the image forming apparatus 1000. The document type determination part 320 determines what document type is processable to the image forming apparatus 1000 or 1200.

15   The sequence control part 310, in response to receipt of a SOAP command associated with cooperation with other apparatuses connected to the image forming apparatus 1200 from the SOAP command analysis part 110 of the server part 100, requests the SOAP command
20   creation part 210 of the client part 200 to acquire a list of document types acquirable from the image forming apparatus 1000. In response to receipt of the acquirable document type list from the SOAP response interpretation part 220, the sequence control part 310
25   requests the document type determination part 320 to

determine a document type processable to the image

forming apparatuses 1000 and 1200. Then, the sequence

control part 310 instructs the SOAP command creation

part 210 to request the image forming apparatus 1000 to

5 send a page image in the format of the determined

document type. In response to receipt of the page image

from the image forming apparatus 1000 corresponding to

the page image request command via the SOAP response

interpretation part 220, the sequence control part 310

10 instructs the SOAP command creation part 210 to

internally issue a SOAP command to store the page image

in HDD 1303 to the SOAP command analysis part 110 of the

server part 100. In response to receipt of the process

request from the SOAP command analysis part 110, the

15 document management Web service execution part 130

stores the page image in HDD 1303.

In order to determine the best document type,

the document type determination part 320 determines

whether there is a processable document type shared in a

20 transmitter document type list 302 and a receiver

document type list 304 sent from the sequence control

part 310. Here, the transmitter document type list 302

includes document types acquirable from the image

forming apparatus 1000. On the other hand, the receiver

25 document type list 304 includes document types writable

in the image forming apparatus 1200. The document type determination part 320 informs the sequence control part 310 of the determined document type.

A description is given, with reference to FIG. 5, of a functional structure of the image forming apparatus 1000 according to the first embodiment. In the first embodiment, the image forming apparatus 1000 serves as a document transmitted apparatus to send a document stored therein to the image forming apparatus 1200.

FIG. 5 shows an exemplary functional structure of the image forming apparatus 1000 having no document process control part 300 according to the first embodiment wherein the same parts as those of the image forming apparatus 1200 shown in FIG. 4 are designated by the same reference numerals followed by the letter "B". The image forming apparatus 1000 has the same functional components except that the image forming apparatus 1000 does not have the document process control part 300.

Referring to FIG. 5, a SOAP command analysis part 110B of a server part 100B, in response to receipt of an HTTP request from the image forming apparatus 1200 or the terminal 30 via httpd 2B of NCS 1228B, analyzes a SOAP command incorporated in the HTTP request, and requests a document management Web service execution

part 130B, which serves as a Web service function (WSF) to provide Web services, to perform a process corresponding to the SOAP command. A SOAP response creation part 120B of the server part 100B, in response

5   to receipt of a process result of the document management Web service execution part 130B, creates a SOAP response corresponding to the process result, and sends the HTTP response as a Web service to the image forming apparatus 1200 or the terminal 30 via httpd 2B

10   of NCS 1228.

The document management Web service execution part 130B, in response to receipt of the process request from the SOAP command analysis part 110B, the document management Web service execution part 130B acquires a

15   document list, thumbnail data, bibliographic information, a processable document type list or a page image from HDD 1303B, and then sends the acquired information as the process result to the SOAP response creation part 120B.

20   The SOAP command creation part 210B of the client part 200B, in response to manipulation of a user, issues a process request using a ticket to the image forming apparatus 1200. The SOAP response interpretation part 220B of the client part 200B

25   interprets a process result sent from the image forming

apparatus 1200.

A description is given, with reference to FIG. 6, of a functional structure of the terminal 30 having no document process control part 300 according to the first embodiment.

FIG. 6 shows an exemplary functional structure of the terminal 30 having no document process control part 300 according to the first embodiment.

Referring to FIG. 6, the terminal 30, which is embodied, for example, as PC 30-1, a mobile phone 30-2 or PDA (Personal digital Assistant) 30-2, comprises a network control part 330, a client part 200C, an input/output (I/O) control part 340 and a display part 13. The network control part 330 controls communications via the network 15 in accordance with HTTP. The client part 200C controls exchanging of SOAP messages. The I/O control part 340 controls input/output of data between the terminal 30 and a user of the terminal. The display part 13 displays data supplied from the I/O control part 340.

In the terminal 30, a user selects a target document to be copied from listed documents, which are displayed on the display part 13, stored in the image forming apparatus 1000 by means of an input device (not illustrated) such as a mouse or a keyboard, and then

designates the image forming apparatus 1200 as an apparatus to which the selected document should be copied. When the user inputs data, the I/O control part 340 sends the data to the SOAP command creation part

5 210C. Based on the data sent from the I/O control part 340, the SOAP command creation part 210C generates a SOAP command to copy the selected document from the image forming apparatus 1000 to the image forming apparatus 1200, and sends the SOAP command to the

10 network control part 330. The network control part 330 sends the SOAP command as an HTTP request to the image forming apparatus 1200.

The network control part 330, in response to receipt of an HTTP response from the image forming

15 apparatus 1200, sends the HTTP response to the SOAP response interpretation part 220C of the client part 200C. The SOAP response interpretation part 220C extracts a process result from the HTTP response, and sends the process result to the I/O control part 340 so

20 as to display the process result on the display part 13. The I/O control part 340 displays the process result on the display part 13.

A description is given, with reference to FIG. 7, of a first document copying process for the above-

25 mentioned first pattern in FIG. 3 according to the first

embodiment. In the first pattern, a selected document stored in the image forming apparatus 1000 is copied to the image forming apparatus 1200 through user's manipulation on the operation panel 1310 of the image

5   forming apparatus 1200.

FIG. 7 shows an exemplary operation of the first document copying process for the first pattern according to the first embodiment.

Referring to FIG. 7, a user of the image

10   forming apparatus 1200 selects the image forming apparatus 1000 accommodating a desired document from listed apparatuses, which is displayed on the operation panel 1310, connected to the image forming apparatus 1200 via the network 15 at step S110.

15   At step S111, the image forming apparatus 1200 sends to the image forming apparatus 1000 a document list request command to request a list of documents stored in the image forming apparatus 1000.

At step S111-2, the image forming apparatus

20   1000, in response to receipt of the document list request command from the image forming apparatus 1200, uses the document management Web service execution part 130B to acquire the document list from HDD 1303B and sends the document list to the image forming apparatus

25   1200.

At step S112, the image forming apparatus 1200, in response to receipt of the document list from the image forming apparatus 1000, sends to the image forming apparatus 1000 a thumbnail request command to request

5 thumbnail data to be displayed on the operation panel 1310.

At step S112-2, when the image forming apparatus 1000 receives the thumbnail request command from the image forming apparatus 1200, the document

10 management Web service execution part 130B operates corresponding to the thumbnail request command. Then, the image forming apparatus 1000 sends to the image forming apparatus 1200 the thumbnail data acquired by the document management Web service execution part 130B.

15 For example, the thumbnail data are reduced-size image data of the top pages of documents stored in the image forming apparatus 1000.

At step S113, when the document list of the image forming apparatus 1000 is displayed in thumbnail

20 representation on the operation panel 1310 of the image forming apparatus 1200, the user determines which document should be copied to which apparatus by dragging and dropping a thumbnail of a desired document to a desired apparatus. In this embodiment, the user drags

25 and drops a document stored in the image forming

apparatus 1000 to the image forming apparatus 1200.

At step S114, the image forming apparatus 1200 sends to the image forming apparatus 1000 a bibliographic information request command to request

5 bibliographic information regarding the selected document.

At step S114-2, the image forming apparatus 1000, in response to receipt of the bibliographic information request command from the image forming

10 apparatus 1200, uses the document management Web service execution part 130B to acquire the bibliographic information from HDD 1303B and sends the bibliographic information to the image forming apparatus 1200.

At step S115, the image forming apparatus 1200,

15 in response to receipt of the bibliographic information from the image forming apparatus 1000, internally acquires system information regarding the image forming apparatus 1200, and examines feasibility of the copying process using a ticket based on the system information.

20 At step S116, the image forming apparatus 1200 displays a copying confirmation dialog on the operation panel 1310.

When the user chooses OK to start the copying process at step S117, the sequence control part 310 of

25 the image forming apparatus 1200 starts the copying

process in cooperation with the image forming apparatus
1000.

At step S118, the image forming apparatus 1200
send to the image forming apparatus 1000 an acquirable

5   document type list request command to request a list of
document types acquirable from the image forming
apparatus 1000.

At step S118-2, the image forming apparatus
1000, in response to receipt the acquirable document

10 type list request command from the image forming
apparatus 1200, sends the acquirable document type list
to the image forming apparatus 1200.

At step S119, the image forming apparatus 1200,
in response to receipt of the acquirable document type

15 list from the image forming apparatus 1000, maintains
the acquirable document type list as a transmitter
document type list 302. Furthermore, the sequence
control part 310 of the image forming apparatus 1200
internally issues a writable document type list request

20 command to request a list of document types writable in
the image forming apparatus 1200, and sets the writable
document type list as a receiver document type list 304.

At step S120, the sequence control 310 of the
image forming apparatus 1200 uses the document type

25 determination part 320 to determine whether or not there

is a document type acquirable from the image forming
apparatus 1000 and writable in the image forming
apparatus 1200 based on the transmitter document type
list 302 and the receiver document type list 304, and

5   then determines the best document type. Based on the
determination, if there are a plurality of such document
types, the document type determination part 320
determines one of the document types as the best
document type. If there is no such a document type, the

10   document type determination part 320 determines a
predetermined document type as the best document type.
Then, the sequence control part 310 instructs the SOAP
command creation part 210 to send to the image forming
apparatus 1200 a ticket request command as a SOAP

15   command.

At step S121, the image forming apparatus 1200
sends to the image forming apparatus 1000 such a ticket
request command to request a ticket to use the selected
document.

20   At step S121-2, the image forming apparatus
1000, in response to receipt of the ticket request
command from the image forming apparatus 1200, sends the
ticket to the image forming apparatus 1200 so that the
image forming apparatus 1200 can perform the copying

25   process for the image forming apparatus 1000 through the

ticket management Web service application 1217.

At step S122, the image forming apparatus 1200, in response to receipt of the ticket from the image forming apparatus 1000, internally issues a document

5 copying request to copy the selected document stored in the image forming apparatus 1000 by authority of the ticket. Namely, the image forming apparatus 1200 creates a document copying request command as a SOAP command issued to the image forming apparatus 1200

10 itself.

At step S123, the image forming apparatus 1200, in response to receipt of the internally issued document copying request command, sends to the image forming apparatus 1000 a page image request command to request a

15 page image in the format of the determined document type designated in the ticket in the page image request command.

At step S123-2, the image forming apparatus 1000, in response to receipt of the page image request

20 command from the image forming apparatus 1200, sends to the image forming apparatus 1200 a page image of the selected document in the format of the document type. In the page image request command, for example, a plurality of page images of the selected document may be

25 designated. Alternatively, whenever the image forming

apparatus 1200 receives each page image from the image
forming apparatus 1000, the image forming apparatus 1200
may iteratively send to the image forming apparatus 1000
a page image request command for the next page image.

5   At step S124, the image forming apparatus 1200
stores the page image sent from the image forming
apparatus 1000 in HDD 1303.

At step S125, after storing all page images in
HDD 1303, the image forming apparatus 1200 displays on

10   the operation panel 1310 a copying completion dialog to
indicate that the copying process has been terminated.

In the image forming apparatus 1200, which
serves as the document receiver apparatus, the SOAP
command creation part 210 of the client part 200 sets

15   request commands sent to the image forming apparatus
1000 as SOAP commands incorporated in messages of HTTP
requests (S111, S112, S114, S118, S121 and S123). The
SOAP response interpretation part 220 of the client part
200 extracts HTTP responses for process results

20   corresponding to the HTTP requests.

On the other hand, in the image forming
apparatus 1000, which serves as the document transmitter
apparatus, the SOAP command analysis part 110B of the
server part 100B analyzes received request commands as

25   SOAP commands, and the document management Web service

execution part 130B executes processes corresponding to the HTTP requests. The SOAP response creation part 120B of the server part 100B provides the image forming apparatus 1200 with process results of the document

5   management Web service execution part 130B as Web services (S111-2, S112-2, S114-2, S118-2, S121-2 and S123-2).

According to the above-mentioned first document copying process, when a user of the image

10   forming apparatus 1200 having the document process control part 300 selects a document stored in the image forming apparatus 1000, the document can be copied from the image forming apparatus 1000 to the image forming apparatus 1200 by storing the document in HDD 1303 of

15   the image forming apparatus 1200 in an appropriate document type.

A description is given, with reference to FIG. 8, of a second document copying process for the above-mentioned second pattern in FIG. 3 according to the

20   first embodiment. In the second pattern, a selected document stored in the image forming apparatus 1000 is copied to the image forming apparatus 1200 through user's manipulation on the operation panel 1310B of the image forming apparatus 1000.

25   FIG. 8 shows an exemplary operation of the

second document copying process for the second pattern
according to the first embodiment.

Referring to FIG. 8, a user of the image
forming apparatus 1000 selects the image forming
5   apparatus 1000 accommodating a desired document from
listed apparatuses, which is displayed on the operation
panel 1310B, connected to the image forming apparatus
1000 via the network 15 at step S130.

At step S131, the image forming apparatus 1000
10   internally issues a document list request command to
request a list of documents stored in the image forming
apparatus 1000, and uses the document management Web
service execution part 130B to acquire the document list
from HDD 1303B.

15   At step S132, the image forming apparatus 1000,
in response to acquisition of the document list,
internally issues a thumbnail request command to request
thumbnail data to be displayed on the operation panel
1310B, and uses the document management Web service
20   execution part 130B to acquire the thumbnail data.
Based on the thumbnail data, the image forming apparatus
1000 displays on the operation panel 1310B the document
list in thumbnail representation. For example, the
thumbnail data are reduced-size image data of the top
25   pages of documents stored in the image forming apparatus

1000.

At step S133, when the document list of the image forming apparatus 1000 is displayed in thumbnail representation on the operation panel 1310B of the image
5 forming apparatus 1000, the user determines which document should be copied to which apparatus by dragging and dropping a thumbnail of a desired document to a desired apparatus. In this embodiment, the user drags and drops a document stored in the image forming
10 apparatus 1000 toward the image forming apparatus 1200.

At step S134, the image forming apparatus 1000 internally issues a bibliographic information request command to request bibliographic information regarding the selected document, and uses the document management
15 Web service execution part 130B to acquire the bibliographic information from HDD 1303B.

At step S135, the image forming apparatus 1000 sends to the image forming apparatus 1200 a system information request command to request system
20 information regarding the image forming apparatus 1200.

At step 135-2, the image forming apparatus 1200, in response to receipt of the system information request command from the image forming apparatus 1000, sends to the image forming apparatus 1000 the system
25 information including ticket information to indicate

feasibility of the copying process using a ticket.

At step S136, the image forming apparatus 1000, in response to receipt of the system information from the image forming apparatus 1200, displays a copying confirmation dialog on the operation panel 1310B.

When the user chooses OK to start the copying process at step S137, the image forming apparatus 1000 uses the ticket management Web application 1217 to internally issue a ticket at step S138.

At step S139, the image forming apparatus 1000 send to the image forming apparatus 1200 a document copying request command to copy the selected document by authority of the internally issued ticket.

At step S140, the image forming apparatus 1200, in response to receipt of the document copying request command from the image forming apparatus 1000, uses the document process control part 300 to start the copying process in cooperation with the image forming apparatus 1000. Then, the image forming apparatus 1200 sends to the image forming apparatus 1000 an acquirable document type list request command to request a list of document types acquirable from the image forming apparatus 1000.

At step S140-2, the image forming apparatus 1000, in response to receipt of the acquirable document type list request command from the image forming

apparatus 1200, sends the acquirable document type list
to the image forming apparatus 1200.

At step S141, the image forming apparatus 1200,
in response to receipt of the acquirable document type
5   list from the image forming apparatus 1000, maintains
the acquirable document type list as a transmitter
document type list 302. Furthermore, the sequence
control part 310 of the image forming apparatus 1200
internally issues a writable document type list request
10   command to request a list of document types writable in
the image forming apparatus 1200, and sets the writable
document type list as a receiver document type list 304.

At step S142, the sequence control 310 of the
image forming apparatus 1200 uses the document type
15   determination part 320 to determine whether or not there
is a document type acquirable from the image forming
apparatus 1000 and writable in the image forming
apparatus 1200 based on the transmitter document type
list 302 and the receiver document type list 304, and
20   then determines the best document type. Based on the
determination, if there are a plurality of such document
types, the document type determination part 320
determines one of the document types as the best
document type. If there is no such a document type, the
25   document type determination part 320 determines a

predetermined document type as the best document type.

At step S143, the sequence control part 310 instructs the SOAP command creation part 210 to send to the image forming apparatus 1000 a page image request command using the ticket, in which the determined document type is specified, as a SOAP command.

At step S143-2, the image forming apparatus 1000, in response to receipt of the page image request command from the image forming apparatus 1200, sends to the image forming apparatus 1200 a page image of the selected document in the format of the document type specified in the ticket. In the page image request command, for example, a plurality of page images of the selected document may be designated. Alternatively, whenever the image forming apparatus 1200 receives each page image from the image forming apparatus 1000, the image forming apparatus 1200 may iteratively send to the image forming apparatus 1000 a page image request command for the next page image.

At step S144, the image forming apparatus 1200 stores the page image sent from the image forming apparatus 1000 in HDD 1303.

At step S144-2, after storing all page images in HDD 1303, the image forming apparatus 1200 uses the sequence control part 310 to send a copying completion

acknowledge to the image forming apparatus 1000.

At step S145, the image forming apparatus 1000, in response to receipt of the copying completion message from the image forming apparatus 1200, displays on the operation panel 1310B a copying completion dialog to indicate that the copying process has been terminated.

In the image forming apparatus 1200, which serves as the document receiver apparatus, the SOAP command creation part 210 of the client part 200 sets request commands sent to the image forming apparatus 1000 as SOAP commands incorporated in messages of HTTP requests (S140 and S143). The SOAP response interpretation part 220 of the client part 200 extracts HTTP responses for process results corresponding to the HTTP requests. Also, the SOAP command analysis part 110 of the server part 100 analyzes request command received from the image forming apparatus 1000 as SOAP commands, and determines whether the SOAP commands are document copying request commands using a ticket.

On the other hand, in the image forming apparatus 1000, which serves as the document transmitter apparatus, the SOAP command creation part 210B of the client part 200B sets request commands sent to the image forming apparatus 1200 as SOAP commands incorporated in messages of HTTP requests (S135 and S139), and the SOAP

response interpretation part 220B of the client part
200B extracts HTTP responses for process results
corresponding to the HTTP requests. Also, the SOAP
command analysis part 110B of the server part 100B

5   analyzes request commands received from the image
forming apparatus 1200 as SOAP commands.

According to the above-mentioned second
document copying process, when a user of the image
forming apparatus 1000 having no document process

10   control part 300 selects a document stored in the image
forming apparatus 1000, the document can be copied from
the image forming apparatus 1000 to the image forming
apparatus 1200 by storing the document in HDD 1303 of
the image forming apparatus 1200 in an appropriate

15   document type.

A description is given, with reference to FIG.
9, of a third document copying process for the above-
mentioned third pattern in FIG. 3 according to the first
embodiment.

20   In the third pattern, a selected document
stored in the image forming apparatus 1000 is copied to
the image forming apparatus 1200 through user's
manipulation on the display part 13 of the terminal 30.

FIG. 9 shows an exemplary operation of the

25   third document copying process for the third pattern

according to the first embodiment.

Referring to FIG. 9, a user of the terminal 30 selects the image forming apparatus 1000 accommodating a desired document from listed apparatuses, which are
5   displayed on the display part 13, connected to the terminal 30 via the network 15 at step S150.

At step S151, the terminal 30 sends to the image forming apparatus 1000 a document list request command to request a list of documents stored in the
10   image forming apparatus 1000.

At step S151-2, the image forming apparatus 1000, in response to receipt of the document list request command from the terminal 30, uses the document management Web service execution part 130B to acquire
15   the document list from HDD 1303B and sends the document list to the terminal 30.

At step S152, the terminal 30, in response to receipt of the document list from the image forming apparatus 1000, sends to the image forming apparatus
20   1000 a thumbnail request command to request thumbnail data to be displayed on the display panel 13.

At step S152-2, when the image forming apparatus 1000 receives the thumbnail request command from the terminal 30, the document management Web
25   service execution part 130B operates corresponding to

the thumbnail request command. Then, the image forming apparatus 1000 uses the document management Web service execution part 130B to acquire the thumbnail data from HDD 1303B and sends the thumbnail data to the terminal

5 30. For example, the thumbnail data are reduced-size image data of the top pages of documents stored in the image forming apparatus 1000.

At step S153, when the document list of the image forming apparatus 1000 is displayed in thumbnail

10 representation on the display part 13 of the terminal 30, the user determines which document should be copied to which apparatus by dragging and dropping a thumbnail of a desired document toward a desired apparatus. In this embodiment, the user drags and drops a document stored

15 ·in the image forming apparatus 1000 toward the image forming apparatus 1200.

At step S154, the terminal 30 sends to the image forming apparatus 1000 a bibliographic information request command to request bibliographic information

20 regarding the selected document.

At step S154-2, the image forming apparatus 1000, in response to receipt of the bibliographic information request command from the terminal 30, uses the document management Web service execution part 130B

25 to acquire the bibliographic information from HDD 1303B

and sends the bibliographic information to the terminal
30.

At step S155, the terminal 30, in response to
receipt of the bibliographic information from the image
5   forming apparatus 1000, sends to the image forming
apparatus 1200 a system information request command to
request system information regarding the image forming
apparatus 1200.

At step S155-2, the terminal 30, in response
10 to receipt of the system information from the image
forming apparatus 1200, examines feasibility of the
copying process using a ticket.

At step S156, the terminal 30 displays a
copying confirmation dialog on the display part 13.

15   When the user chooses OK to start the copying
process at step S157, the terminal 30 sends to the image
forming apparatus 1000 a ticket request command to
request a ticket to use the selected document stored in
the image forming apparatus at step S158.

20   At step S158-2, the image forming apparatus
1000, in response to receipt of the ticket request
command from the terminal 30, sends the ticket to the
terminal 30.

At step S159, the terminal 30, in response to
25 receipt the ticket from the image forming apparatus 1000,

sends to the image forming apparatus 1200 a document copying request command to copy the selected document from the image forming apparatus 1000 by authority of the ticket.

5   At step S160, when the image forming apparatus 1200 receives the document copying request command from the terminal 30, the sequence control part 310 of the image forming apparatus 1200 starts the copying process in cooperation with the image forming apparatus 1000.

10   Then, the image forming apparatus 1200 uses the sequence control part 310 to send to the image forming apparatus 1000 an acquirable document type list request command to request a list of document types acquirable from the image forming apparatus 1000.

15   At step S160-2, the image forming apparatus 1000, in response to receipt the acquirable document type list request command from the image forming apparatus 1200, sends the acquirable document type list to the image forming apparatus 1200.

20   At step S161, the image forming apparatus 1200, in response to receipt of the acquirable document type list from the image forming apparatus 1000, maintains the acquirable document type list as a transmitter document type list 302. Furthermore, the sequence

25   control part 310 of the image forming apparatus 1200

internally issues a writable document type list request command to request a list of document types writable in the image forming apparatus 1200, and sets the writable document type list as a receiver document type list 304.

5   At step S162, the sequence control part 310 of the image forming apparatus 1200 uses the document type determination part 320 to determine whether or not there is a document type acquirable from the image forming apparatus 1000 and writable in the image forming

10 apparatus 1200 based on the transmitter document type list 302 and the receiver document type list 304, and then determines the best document type. Based on the determination, if there are a plurality of such document types, the document type determination part 320

15 determines one of the document types as the best document type. If there is no such a document type, the document type determination part 320 determines a predetermined document type as the best document type. Then, the sequence control part 310 instructs the SOAP

20 command creation part 210 to send to the image forming apparatus 1000 a page image request command to request a page image of the selected document by authority of the ticket as a SOAP command.

        At step S163, the image forming apparatus 1200

25 sends to the image forming apparatus 1000 the page image

request command to request a page image of the selected document in the format of the document type designated in the ticket.

At step S163-2, the image forming apparatus 1000, in response to the page image request command from the image forming apparatus 1200, sends to the image forming apparatus 1200 a page image of the selected document in the format of the designated document type. In the page image request command, for example, a plurality of page images of the selected document may be designated. Alternatively, whenever the image forming apparatus 1200 receives each page image from the image forming apparatus 1000, the image forming apparatus 1200 may iteratively send to the image forming apparatus 1000 a page image request command for the next page image.

At step S164, the image forming apparatus 1200 stores the page image sent from the image forming apparatus 1000 in HDD 1303.

At step S164-2, after storing all page images of the selected document in HDD 1303, the image forming apparatus 1200 sends to the terminal 30, which issues the document copying request command at step S159, a copying completion message to indicate that the copying process has been terminated.

At step S165, the terminal 30, in response to

receipt of the copying completion message from the image

forming apparatus 1200, displays on display part 13 a

copying completion dialog to indicate that the copying

process has been terminated.

5   In the terminal 30, which serves as an

operator apparatus, the SOAP command creation part 210C

of the client part 200C sets request commands sent to

the image forming apparatuses 1000 and 1200 as SOAP

commands incorporated in messages of HTTP requests (S151,

10   S152, S154, S155, S158 and S159). The SOAP response

interpretation part 220C of the client part 200C

extracts HTTP responses for process results

corresponding to the HTTP requests.

         In the image forming apparatus 1000, which

15   serves as the document transmitter apparatus, the SOAP

command analysis part 110B of the server part 100B

analyzes request commands received from the terminal 30

and the image forming apparatus 1200 as SOAP commands,

and the document management Web service execution part

20   130B executes processes corresponding to the HTTP

requests. The SOAP response creation part 120B of the

server part 100B provides the image forming apparatus

1200 and the terminal 30 with process results of the

document management Web service execution part 130B as

25   Web services (S151-2, S152-2, S154-2 and S158-2).

On the other hand, in the image forming apparatus 1200, which serves as the document receiver apparatus, the SOAP command creation part 210 of the client part 200 sets request commands sent to the image

5   forming apparatus 1000 as SOAP commands incorporated in messages of HTTP requests (S160 and S163). The SOAP response interpretation part 220 of the client part 200 extracts HTTP responses for process results corresponding to the HTTP requests. Also, the SOAP

10   command analysis part 110 of the server part 100 analyzes received request command as SOAP commands, and the SOAP response creation part 120 of the server part 100 provides the terminal 30 with process results corresponding to the SOAP commands as Web services

15   (S155-2 and S164-2).

According to the above-mentioned third document copying process, when a user of the terminal 30 selects a document stored in the image forming apparatus 1000, the document can be copied from the image forming

20   apparatus 1000 to the image forming apparatus 1200 having the document process control part 300 by storing the document in HDD 1303 of the image forming apparatus 1200 in an appropriate document type.

A description is given, with reference to FIG.

25   10 through FIG. 15, of the above-mentioned individual

HTTP requests and the corresponding HTTP responses
according to the first embodiment.

FIG. 10 shows an exemplary HTTP request for a
document copying request command using a ticket.

5   Referring to FIG. 10, a code portion 31
indicates a URL (Uniform Resource Locator) to which the
HTTP request should be sent by POST method. For example,
the URL "netdoc" is designated in the code portion 31.
Furthermore, a code portion 32 indicates a URL to

10   indicate the purpose of the HTTP request. For example,
the URL "http://foo.bar.com/netdoc/documentmanagement"
is described in the code portion 32 to designate
document management as the purpose of the HTTP request.

In a code portion 33, a SOAP header is

15   provided to indicate a root element. In a code portion
34, a SOAP body is provided. The code portion 34
includes a code portion 35 ranging from
<ns:documentmanagement> to </ns:documentmanagement>. In
the code portion 35, a SOAP command to specify a

20   requested process, information referred to for the
process and others are described. In the document
copying request command using a ticket, a ticket number
is specified in a code portion 36 ranging from
<ticketId> to </ticketId>, and the SOAP command is

25   specified in a code portion 37 ranging from <operation>

to </operation>. For example, "123" and "getFileByTicket" are designated as the ticket number and the SOAP command, respectively, in the illustration.

FIG. 11 shows an exemplary HTTP response

5   corresponding to the HTTP request shown in FIG. 10.

Referring to FIG. 11, a code portion 42 indicates that the HTTP request shown in FIG. 10 has been successfully fulfilled. In a code portion 43, a SOAP header is provided to indicate a root element. In

10   a code portion 44, a SOAP body is provided. The code portion 44 includes a code portion 45 ranging from <ns:documentmanagementResponse> to </ns:documentmanagementResponse>. In the code portion 45, "success" to indicate that the requested process has

15   been successfully terminated is described.

FIG. 12 shows an exemplary HTTP request for an acquirable document type list request command according to the first embodiment. In FIG. 12, the same code portions as those shown in FIG. 10 are designated by the

20   same reference numerals, and the description thereof is omitted.

Referring to FIG. 12, a code portion 34 is the SOAP body of the HTTP request. In a code portion 50 ranging from <operation> to </operation>, a SOAP command

25   "getFileVariation" is designated.

FIG. 13 shows an exemplary HTTP response corresponding to the HTTP request shown in FIG. 12. In FIG. 13, the same code portions as those shown in FIG. 11 are designated by the same reference numerals, and

5   the description thereof is omitted.

Referring to FIG. 13, a code portion 44 is the SOAP body of the HTTP response. In code portions 52, 53 and 54, each of which ranges from <type> to </type>, three document types acquirable from the image forming

10 apparatus 1000 are set. In the code portion 52, a compression format of image data is designated as "Tiff" by sandwiching between <format> and </format>. An image type is designated as "1bit/dot" by sandwiching between <imageType> and </imageType>. A resolution is

15 designated as "600×600" by sandwiching between <binary> and </binary>. In the code portion 53, a compression format of image data is designated as "Jpeg" by sandwiching between <format> and </format>. An image type is designated as "8bit/dot" by sandwiching between

20 <imageType> and </imageType>. A resolution is designated as "300×300" by sandwiching between <binary> and </binary>. In the code portion 54, a compression format of image data is designated as "Jpeg2000" by sandwiching between <format> and </format>. An image

25 type is designated as "8bit/dot" by sandwiching between

<imageType> and </imageType>. A resolution is
designated as "600×600" by sandwiching between <binary>
and </binary>.

When the image forming apparatus 1200 receives
such an HTTP response, the SOAP response interpretation
part 220 extracts document types from the code portions
52 through 54, and the document types {"Tiff",
"1bit/dot", 600×600}, {"Jpeg", "8bit/dot", 300×300} and
{"Jpeg2000", "8bit/dot", 600×600} are set as a
transmitter document type list 302. On the other hand,
for example, when the image forming apparatus 1200
acquires document types {"Tiff", "8bit/dot", 600×600}
and {"Jpeg", "8bit/dot", 300×300} by internally issuing
an acquirable document type list request command, the
document types {"Tiff", "8bit/dot", 600×600} and
{"Jpeg", "8bit/dot", 300×300} are set as a receiver
document type list 304. The document type determination
part 320 determines whether or not there is a document
type commonly included in the transmitter document type
list 302 and the receiver document type list 304. In
this example, the document type determination part 320
selects the document type {"Jpeg", "8bit/dot", 300×300},
because only the document type {"Jpeg", "8bit/dot",
300×300} is commonly included in the transmitter
document type list 302 and the receiver document type

list 304. The determined document type is set in an
HTTP request as illustrated in FIG. 14.

FIG. 14 shows an exemplary HTTP request for a
page image request command according to the first
5   embodiment. In FIG. 14, the same code portions as those
shown in FIG. 10 are designated by the same reference
numerals, and the description thereof is omitted.

Referring to FIG. 14, in a code portion 59,
the document type ("Jpeg", "8bit/dot", 300×300) is
10   specified by sandwiching between <type> and </type>. In
addition, in a code portion 60, the SOAP command
"getFile(TicketID" is specified by sandwiching between
<operation and </operation>. In the illustrated HTTP
request, "Jpeg", "8bit/dot" and "300×300" are
15   designated as the image data format, the image type and
the resolution, respectively. In addition,
"getFile(TicketID)" is designated as the SOAP command.

FIG. 15 shows an exemplary HTTP response
corresponding to the HTTP request shown in FIG. 14. In
20   FIG. 15, the same code portions as those shown in FIG.
11 are designated by the same reference numerals, and
the description thereof is omitted.

Referring to FIG. 15, a code portion 61
indicates that there are a plurality of differently
25   formatted data items in the HTTP response. In code

portions 66, "XX_boundary" indicates a boundary between the data items. In a code portion 62, text data information is provided. For example, the text data information may include a text description type, a code

5   type, and the length of the text data. In a code portion 63, "success" is provided between <result> and </result> to indicate that the page image request command has been successfully fulfilled.

On the other hand, in a code portion 64, image

10   data information is provided. For example, the image data information may include an image data type, a transferred data type such as "text" or "binary", and the length of the image data. Subsequently, image data 65 are provided. For example, if the data type is

15   "Tiff" and the transferred data type is "binary", the binary Tiff image data 65 are provided.

In order to copy a document stored in the image forming apparatus 1000, the image forming apparatus 1200 extracts the binary Tiff image data from

20   the HTTP response shown in FIG. 15 and stores the image data in HDD 1303.

In the above description, the HTTP request incorporating image data is sent to the image forming apparatus 1200. However, the image data may be

25   transmitted and received, for example, in accordance

with file transfer protocol (ftp3).

In the first embodiment of the present

invention, the following SOAP commands are used.

[Table 1]

SOAP command	Operation
getList	get a document list
getThumbnail	get thumbnail images
getFileInfo	get file bibliographic information
getSystemInfo	get system information
getFileVariation	get an acquirable or writable document type list
getCopyTicket	get a ticket to copy a document
copyFileByTicket	copy document data through a ticket
getFile(TicketID)	get a document corresponding to a ticket

5   These SOAP commands are designated by

sandwiching between <operation> and </operation> in a

SOAP body as described with reference to FIG. 10, FIG.

12 and FIG. 14.

A description is given, with reference to FIG.

10 . 16 through FIG. 19, of exemplary screens displayed on

the operation panels 1310 and 1310B and the display part

13 according to the first embodiment.

FIG. 16 shows an exemplary copying

manipulation screen 400 according to the first

15   embodiment.

Referring to FIG. 16, the copying manipulation

screen 400 includes an apparatus list display area 401

to display a list of apparatuses connected to each other via the network 15, and a thumbnail display area 402 to display thumbnails of individual documents stored in an apparatus selected in the apparatus list display area

5   401.

In the copying manipulation screen 400, for example, when a user selects the image forming apparatus 1000 as a document transmitter apparatus from listed apparatuses displayed on the apparatus list display area

10   401, a list of documents stored in the image forming apparatus 1000 is displayed in thumbnail representation in the thumbnail display area 402. In the thumbnail display area 402, the user selects a document A and further designates the image forming apparatus 1200 as a

15   document receiver apparatus through user's dragging and dropping operations by means of an arrow 403, as illustrated in FIG. 16. At this time, the user may select a plurality of documents.

When the user designates the image forming

20   apparatus 1200 as the document receiver apparatus through the dragging and dropping operations, a copying confirmation dialog is displayed so that the user can confirm the copying process as illustrated in FIG. 17.

FIG. 17 shows an exemplary copying

25   confirmation dialog 410 according to the first

embodiment.

Referring to FIG. 17, the copying confirmation dialog 410 includes a message display area 411 to display a message to the user, a cancel button 412 to cancel the copying process, and an OK button 413 to start the copying process.

For example, if the user selects a plurality of documents A, B, C and D in the copying manipulation screen 400 shown in FIG. 16, a message such as "May the documents A, B, C and D be copied to the image forming apparatus 1200?" is displayed in the message display area 411 so that the user can confirm the selected documents and apparatus.

Then, when the user chooses the OK button 413 in the copying confirmation dialog 410, a plural document copying mode setting dialog to set a copying mode of the plurality of documents as illustrated in FIG. 18. On the other hand, for example, if the user selects only the document A in the copying manipulation screen 400 shown in FIG. 16, the user can start execution of the copying process by choosing the OK button 413 in the copying confirmation dialog 410 shown in FIG. 17.

FIG. 18 shows an exemplary plural document copying mode setting dialog 440 according to the first embodiment.

Referring to FIG. 18, the plural document copying mode setting dialog 440 includes a copying mode selection area 441 to select a copying mode, a copying order setting button 442 to set a copying order of the

5   documents, a cancel button 443 to cancel the copying process, and an OK button 444 to start the copying process.

In the copying mode selection area 441, a message such as "Copy the selected documents as ○

10   separate documents ○ a single document." is displayed. When the user chooses one of the two options, the selected option is displayed as ◎. In the illustrative example, the user selects "a single document". In addition, when the user selects the copying order

15   setting button 442 to designate a copying order of the documents, a plural document copying order setting dialog is displayed as illustrated in FIG. 19.

FIG. 19 shows an exemplary plural document copying order setting dialog 450 according to the first

20   embodiment.

Referring to FIG. 19, the plural document copying order setting dialog 450 includes a selected document list display area 451 to display a list of documents selected by the user, an UP button 452 to

25   ascend the copying order of a document, a DOWN button

453 to descend the copying order of a document, a cancel button 454 to cancel the copying process, and an OK button 455 to start the copying process.

5   In the plural document copying order setting dialog 450, if the user wants to ascend the copying order of the document B, the user first selects the document B in the selected document list display area 451 and then chooses the UP button. As a result, the document B can be copied before the document A. In 10   contrast, if the user chooses the DOWN button 453, the document B can be copied after the document C or the document D. After setting the copying order, if the user chooses the OK button 455, the copying process is started, and the documents A through D are copied from 15   the image forming apparatus 1000 to the image forming apparatus 1200 in the designated copying order.

In the first and second embodiments of the present invention, when the image forming apparatus 1200 having the document process control part 300 requests a 20   selected document stored in the image forming apparatus 1000 in the format of a document type that is determined based on document types processable to the image forming apparatuses 1000 and 1200, the corresponding image processing process can be performed in the image forming 25   apparatus 1200 in cooperation with the apparatuses

connected to each other via the network. For example, if the size of a document that the image forming apparatus 1000, which serves as the document transmitter apparatus, accommodates is greater than the maximal size

5 of documents that the image forming apparatus 1200, which serves as the document receiver apparatus, can store, the document process control part 300 of the image forming apparatus 1200 can use an image scaling function thereof to provide a reduced-size page image

10 based on determination of the document type determination part 320.

Also, since the document process control part 300 flexibly controls cooperation with the image forming apparatuses 1000 and 1200 depending on types of

15 processes such as a copying process and a printing process, it is possible to perform various types of processes through cooperation with apparatuses connected via a network.

In the first and second embodiments, the

20 copying process and the printing process that are performed through cooperation with apparatuses connected via a network are described. However, the present invention is not limited to these processes. The present invention is applicable to file management,

25 scanner control and so on. Furthermore, the present

invention is applicable to process information regarding the image forming apparatuses 1000 and 1200.

Also, the image forming apparatuses 1000 and 1200 and the terminal 30 according to the embodiments are not limited to communication via a fixed line LAN (Local Area Network). In other words, although physical layers differs in a network system, such as a wireless LAN and Bluetooth, SOAP messages can be exchanged in such a network system in accordance with TCP/IP (Transmission Control Protocol/Internet Protocol). Thus, it is possible to implement various processes according to the embodiments as Web services in accordance with http and SOAP. Furthermore, communicated contents are allowed to be extended in a parallel system, such as a centronics and SCSI. Thus, as long as there is agreement between devices that will communicate each other, it is possible to implement message exchange in accordance with SOAP.

A description is given, with reference to FIG. 20 through FIG. 26, of a document printing process according to a second embodiment of the present invention.

In the above-mentioned first embodiment, a document is copied in accordance with the three patterns shown in FIG. 3 from the image forming apparatus 1000 to

the image forming apparatus 1200 in cooperation with apparatuses connected to each other. In the second embodiment of the present invention, the image forming apparatus 1200 prints out a copy of a document stored in

5   the image forming apparatus 1000 in accordance with the same three pattern shown in FIG. 3.

In the second embodiment, the image forming apparatuses 1000 and 1200 have the functional structures shown in FIG. 1 and the hardware configurations shown in

10   FIG. 2. Also, the image forming apparatus 1000 having no document process control part 300 has the functional structure shown in FIG. 5. In addition, the terminal 30 having no document process control part 300 has the functional structure shown in FIG. 6. For this reason,

15   the description of the functional structures thereof is omitted.

FIG. 20 shows an exemplary functional structure of a network system according to the second embodiment. In the illustrated network system, the

20   image forming apparatus 1200, an image forming apparatus 1000 having the fundamentally same functions as the image forming apparatus 1200, and a terminal 30 are connected to each other via a network 15. The image forming apparatus 1000 does not have to include the

25   document process control part 300 in the document

management Web service application 1216 shown in FIG. 1.

Referring to FIG. 20, an image of document data or image data (hereinafter which are collectively referred to as a document) stored in HDD 1303B of the image forming apparatus 1000 is formed on a paper 4 in the image forming apparatus 1200, and the image forming apparatus 1200 prints out the image in accordance with illustrated three patterns. In the second embodiment, the image forming apparatus 1000, which serves as a document transmitter apparatus, sends a document stored therein to the image forming apparatus 1200. On the other hand, the image forming apparatus 1200, which serves as a document receiver apparatus, receives the document from the image forming apparatus 1000, and the image forming apparatus 1200 produces a copy of the document.

In the first pattern, a document stored in the image forming apparatus 1000 is printed out in the image forming apparatus 1200 through user's manipulation on an operation panel 1310 of the image forming apparatus 1200. In the second pattern, a document stored in the image forming apparatus 1000 is printed out in the image forming apparatus 1200 through user's manipulation on an operation panel 1310B of the image forming apparatus 1000. In the third pattern, a document stored in the

image forming apparatus 1000 is printed out in the image forming apparatus 1200 through user's manipulation on a display part 13 of the terminal 30.

A description is given, with reference to FIG.
5   21, of a functional structure of the image forming apparatuses 1200 having the document process control part 300.

FIG. 21 shows an exemplary functional structure of the image forming apparatus 1200 having the
10 document process control part 300 according to the second embodiment wherein only primary functional components of the image forming apparatus 1200 are illustrated and the other functional components are omitted. In FIG. 21, the same functional components as
15 those shown in FIG. 4 are designated by the same reference numerals, and the description thereof is omitted.

Referring to FIG. 21, the document management Web service application 1216 of the image forming
20 apparatus 1200 differs from the document management Web service application 1216 according to the first embodiment in that the document management Web service application 1216 according to the second embodiment further comprises a printing Web service execution part
25 140, which serves as a Web service function (WSF) to

provide a Web service, to print a selected document by controlling the plotter 1201.

The document process control part 300 comprises a sequence control part 310 and a document type determination part 320. The sequence control part 310 controls a sequence of processes to print a document stored in the image forming apparatus 1000 in the image forming apparatus 1200 in cooperation with the image forming apparatus 1000. The document type determination part 320 determines what document type is processable to the image forming apparatus 1000 or 1200.

The sequence control part 310, in response to receipt of a SOAP command associated with cooperation with other apparatuses connected to the image forming apparatus 1200 from the SOAP command analysis part 110 of the server part 100, requests the SOAP command creation part 210 of the client part 200 to acquire a list of document types acquirable from the image forming apparatus 1000. In response to receipt of the acquirable document type list from the SOAP response interpretation part 220, the sequence control part 310 requests the document type determination part 320 to determine a document type processable to the image forming apparatuses 1000 and 1200. Then, the sequence control part 310 instructs the SOAP command creation

part 210 to request the image forming apparatus 1000 to

send a page image in the format of the determined

document type. In response to receipt of the page image

from the image forming apparatus 1000 corresponding to

5   the page image request command via the SOAP response

interpretation part 220, the sequence control part 310

instructs the SOAP command creation part 210 to

internally issue a SOAP command to print the page image

to the SOAP command analysis part 110 of the server part

10   100. In response to receipt of the process request from

the SOAP command analysis part 110, the printing Web

service execution part 140 prints out the page image.

In order to determine the best document type,

the document type determination part 320 determines

15   whether there is a processable document type shared in a

transmitter document type list 302 and a receiver

document type list 304 sent from the sequence control

part 310. Here, the transmitter document type list 302

includes document types acquirable from the image

20   forming apparatus 1000. On the other hand, the receiver

document type list 304 includes document types printable

in the image forming apparatus 1200. The document type

determination part 320 informs the sequence control part

310 of the determined document type.

25   A description is given, with reference to FIG.

22, of a first document printing process for the above-mentioned first pattern in FIG. 20 according to the second embodiment.

In the first pattern, a selected document stored in the image forming apparatus 1000 is printed out in the image forming apparatus 1200 through user's manipulation on the operation panel 1310 of the image forming apparatus 1200.

FIG. 22 shows an exemplary operation of the first document printing process for the first pattern according to the second embodiment.

Referring to FIG. 22, a user of the image forming apparatus 1200 selects the image forming apparatus 1000 accommodating a desired document from listed apparatuses, which is displayed on the operation panel 1310, connected to the image forming apparatus 1200 via the network 15 at step S210.

At step S211, the image forming apparatus 1200 sends to the image forming apparatus 1000 a document list request command to request a list of documents stored in the image forming apparatus 1000.

At step S211-2, the image forming apparatus 1000, in response to receipt of the document list request command from the image forming apparatus 1200, uses the document management Web service execution part

130B to acquire the document list from HDD 1303B and sends the document list to the image forming apparatus 1200.

At step S212, the image forming apparatus 1200,
5 in response to receipt of the document list from the image forming apparatus 1000, sends to the image forming apparatus 1000 a thumbnail request command to request thumbnail data to be displayed on the operation panel 1310.

10 At step S212-2, when the image forming apparatus 1000 receives the thumbnail request command from the image forming apparatus 1200, the document management Web service execution part 130B operates corresponding to the thumbnail request command. Then,
15 the image forming apparatus 1000 sends to the image forming apparatus 1200 the thumbnail data acquired by the document management Web service execution part 130B. For example, the thumbnail data are reduced-size image data of the top pages of documents stored in the image
20 forming apparatus 1000.

At step S213, when the document list of the image forming apparatus 1000 is displayed in thumbnail representation on the operation panel 1310 of the image forming apparatus 1200, the user determines which
25 apparatus should print out which document by dragging

and dropping a thumbnail of a desired document to a
desired apparatus. In this embodiment, the user drags
and drops a document in the image forming apparatus 1000
to the image forming apparatus 1200.

5   At step S214, the image forming apparatus 1200
sends to the image forming apparatus 1000 a
bibliographic information request command to request
bibliographic information regarding the selected
document.

10   At step S214-2, the image forming apparatus
1000, in response to receipt of the bibliographic
information request command from the image forming
apparatus 1200, uses the document management Web service
execution part 130B to acquire the bibliographic

15   information from HDD 1303B and sends the bibliographic
information to the image forming apparatus 1200.

           At step S215, the image forming apparatus 1200,
in response to receipt of the bibliographic information
from the image forming apparatus 1000, internally

20   acquires system information regarding the image forming
apparatus 1200, and examines feasibility of the copying
process using a ticket based on the system information.

           At step S216, the image forming apparatus 1200
internally issues a printable document type list request

25   command to request a list of document types printable in

the image forming apparatus 1200.

At step S217, the image forming apparatus 1200 displays a copying or printing confirmation dialog on the operation panel 1310.

5   When the user chooses OK to start the printing process at step S218, the sequence control part 310 of the image forming apparatus 1200 starts the printing process in cooperation with the image forming apparatus 1000.

10   At step S219, the image forming apparatus 1200 send to the image forming apparatus 1000 an acquirable document type list request command to request a list of document types acquirable from the image forming apparatus 1000.

15   At step S219-2, the image forming apparatus 1000, in response to receipt the acquirable document type list request command from the image forming apparatus 1200, sends the acquirable document type list to the image forming apparatus 1200.

20   At step S220, the image forming apparatus 1200, in response to receipt of the acquirable document type list from the image forming apparatus 1000, maintains the acquirable document type list as a transmitter document type list 302. Furthermore, the sequence

25   control part 310 of the image forming apparatus 1200

internally issues a writable document type list request
command to request a list of document types writable in
the image forming apparatus 1200, and sets the writable
document type list as a receiver document type list 304.

5   At step S221, the sequence control 310 of the
image forming apparatus 1200 uses the document type
determination part 320 to determine whether or not there
is a document type acquirable from the image forming
apparatus 1000 and writable in the image forming

10   apparatus 1200 based on the transmitter document type
list 302 and the receiver document type list 304, and
then determines the best document type. Based on the
determination, if there are a plurality of such document
types, the document type determination part 320

15   determines one of the document types as the best
document type. If there is no such a document type, the
document type determination part 320 determines a
predetermined document type as the best document type.
Then, the sequence control part 310 instructs the SOAP

20   command creation part 210 to send to the image forming
apparatus 1200 a ticket request command as a SOAP
command.

          At step S222, the image forming apparatus 1200
sends to the image forming apparatus 1000 such a ticket

25   request command to request a ticket to use the selected

document.

At step S222-2, the image forming apparatus 1000, in response to receipt of the ticket request command from the image forming apparatus 1200, sends the ticket to the image forming apparatus 1200 so that the image forming apparatus 1200 can perform the printing process for the image forming apparatus 1000 through the ticket management Web service application 1217.

At step S223, the image forming apparatus 1200, in response to receipt of the ticket from the image forming apparatus 1000, internally issues a document printing request to print out the selected document stored in the image forming apparatus 1000 by authority of the ticket. Namely, the image forming apparatus 1200 creates a document printing request command as a SOAP command issued to the image forming apparatus 1200 itself.

At step S224, the image forming apparatus 1200, in response to receipt of the internally issued document printing request command, sends to the image forming apparatus 1000 a printing attribute information request command to request printing attribute information to indicate whether the selected document should be double-sided printed or single-sided printed.

At step S224-2, the image forming apparatus

1000, in response to receipt of the printing attribute information request command from the image forming apparatus 1200, sends the printing attribute information to the image forming apparatus 1200.

5   At step S225, the image forming apparatus 1200, in response to receipt of the printing attribute information from the image forming apparatus 1000, internally issues a job creation request command to create a job.

10   At step S226, the image forming apparatus 1200 sets a printing attribute based on the printing attribute information.

      At step S227, the image forming apparatus 1200 sends to the image forming apparatus 1000 a page image

15 request command to request a page image in the format of the determined document type designated in the ticket.

      At step S227-2, the image forming apparatus 1000, in response to receipt of the page image request command from the image forming apparatus 1200, sends to

20 the image forming apparatus 1200 a page image of the selected document in the format of the document type. In the page image request command, for example, a plurality of page images of the selected document may be designated. Alternatively, whenever the image forming

25 apparatus 1200 receives each page image from the image

forming apparatus 1000, the image forming apparatus 1200 may iteratively send to the image forming apparatus 1000 a page image request command for the next page image.

At step S228, after the image forming apparatus 1200 receives all page images of the selected document from the image forming apparatus 1000, the printing Web service execution part 140 uses the plotter 1201 to print out the page images.

At step S229, the image forming apparatus 1200 displays on the operation panel 1310 a printing completion dialog to indicate that the printing process has been terminated.

In the image forming apparatus 1200, which serves as the document receiver apparatus, the SOAP command creation part 210 of the client part 200 sets request commands sent to the image forming apparatus 1000 as SOAP commands incorporated in messages of HTTP requests (S211, S212, S214, S218, S221 and S223). The SOAP response interpretation part 220 of the client part 200 extracts HTTP responses for process results corresponding to the HTTP requests.

On the other hand, in the image forming apparatus 1000, which serves as the document transmitter apparatus, the SOAP command analysis part 110B of the server part 100B analyzes received request commands as

SOAP commands, and the document management Web service execution part 130B executes processes corresponding to the HTTP requests. The SOAP response creation part 120B of the server part 100B provides the image forming

5 apparatus 1200 with process results of the document management Web service execution part 130B as Web services (S211-2, S212-2, S214-2, S219-2, S224-2 and S227-2).

According to the above-mentioned first

10 document printing process, when a user of the image forming apparatus 1200 having the document process control part 300 selects a document stored in the image forming apparatus 1000, the image forming apparatus 1200 can acquire the document in an appropriate document type

15 from the image forming apparatus 1000 and print out the document by means of the plotter 1201.

A description is given, with reference to FIG. 23, of a second document printing process for the above-mentioned second pattern in FIG. 20 according to the

20 second embodiment. In the second pattern, a selected document stored in the image forming apparatus 1000 is printed out in the image forming apparatus 1200 through user's manipulation on the operation panel 1310B of the image forming apparatus 1000.

25 FIG. 23 shows an exemplary operation of the

second document printing process for the second pattern
according to the second embodiment.

Referring to FIG. 23, a user of the image
forming apparatus 1000 selects the image forming

5   apparatus 1000 accommodating a desired document from
listed apparatuses, which is displayed on the operation
panel 1310B, connected to the image forming apparatus
1000 via the network 15 at step S230.

At step S231, the image forming apparatus 1000

10 internally issues a document list request command to
request a list of documents stored in the image forming
apparatus 1000, and uses the document management Web
service execution part 130B to acquire the document list
from HDD 1303B.

15   At step S232, the image forming apparatus 1000,
in response to acquisition of the document list,
internally issues a thumbnail request command to request
thumbnail data to be displayed on the operation panel
1310B, and uses the document management Web service

20 execution part 130B to acquire the thumbnail data.
Based on the thumbnail data, the image forming apparatus
1000 displays on the operation panel 1310B the document
list in thumbnail representation. For example, the
thumbnail data are reduced-size image data of the top

25 pages of documents stored in the image forming apparatus

1000.

At step S233, when the document list of the image forming apparatus 1000 is displayed in thumbnail representation on the operation panel 1310B of the image forming apparatus 1000, the user determines which apparatus should print out which document by dragging and dropping a thumbnail of a desired document to a desired apparatus. In this embodiment, the user drags and drops a document stored in the image forming apparatus 1000 toward the image forming apparatus 1200.

At step S234, the image forming apparatus 1000 internally issues a bibliographic information request command to request bibliographic information regarding the selected document, and uses the document management Web service execution part 130B to acquire the bibliographic information from HDD 1303B.

At step S235, the image forming apparatus 1000 sends to the image forming apparatus 1200 a system information request command to request system information regarding the image forming apparatus 1200.

At step 235-2, the image forming apparatus 1200, in response to receipt of the system information request command from the image forming apparatus 1000, sends to the image forming apparatus 1000 the system information including ticket information to indicate

feasibility of the printing process using a ticket.

At step S236, the image forming apparatus 1000, in response to receipt of the system information from the image forming apparatus 1200, sends to the image

5   forming apparatus 1200 a printable document type list request command to request a list of document types printable in the image forming apparatus 1200.

At step S236-2, the image forming apparatus 1200, in response to receipt of the printable document

10   type list request command from the image forming apparatus 1000, sends the printable document type list to the image forming apparatus 1000.

At step S237, the image forming apparatus 1000, in response to receipt of the printable document type

15   list from the image forming apparatus 1200, displays a copying or printing confirmation dialog on the operation panel 1310B. There is a possibility that the image forming apparatus 1200 may have printing devices (peripheral devices), such as a punching device and a

20   stapling device, different from those of the image forming apparatus 1000. Based on the printable document type list, if there is an attribute that the image forming apparatus 1200 does not cover, the attribute may be displayed as a grey-colored item to indicate

25   unavailability of the attribute. On the other, if the

image forming apparatus 1200 covers an attribute that the image forming apparatus 1000 does not cover, the attribute may be displayed as a selectable attribute.

When the user chooses OK to start the printing process at step S238, the image forming apparatus 1000 uses the ticket management Web application 1217 to internally issue a ticket at step S239.

At step S240, the image forming apparatus 1000 send to the image forming apparatus 1200 a document printing request command to print out the selected document by authority of the internally issued ticket.

At step S241, the image forming apparatus 1200, in response to receipt of the document printing request command from the image forming apparatus 1000, uses the document process control part 300 to start the printing process in cooperation with the image forming apparatus 1000. Then, the image forming apparatus 1200 sends to the image forming apparatus 1000 an acquirable document type list request command to request a list of document types acquirable from the image forming apparatus 1000.

At step S241-2, the image forming apparatus 1000, in response to receipt of the acquirable document type list request command from the image forming apparatus 1200, sends the acquirable document type list to the image forming apparatus 1200.

At step S242, the image forming apparatus 1200, in response to receipt of the acquirable document type list from the image forming apparatus 1000, maintains the acquirable document type list as a transmitter

5 document type list 302. Furthermore, the sequence control part 310 of the image forming apparatus 1200 internally issues a writable document type list request command to request a list of document types writable in the image forming apparatus 1200, and sets the writable

10 document type list as a receiver document type list 304.

At step S243, the sequence control 310 of the image forming apparatus 1200 uses the document type determination part 320 to determine whether or not there is a document type acquirable from the image forming

15 apparatus 1000 and writable in the image forming apparatus 1200 based on the transmitter document type list 302 and the receiver document type list 304, and then determines the best document type. Based on the determination, if there are a plurality of such document

20 types, the document type determination part 320 determines one of the document types as the best document type. If there is no such a document type, the document type determination part 320 determines a predetermined document type as the best document type.

25 At step S244, the image forming apparatus 1200

sends to the image forming apparatus 1000 a printing

attribute information request command to request

printing attribute information to indicate whether the

selected document should be double-sided printed or

5   single-sided printed.

At step S244-2, the image forming apparatus

1000, in response to receipt of the printing attribute

information request command from the image forming

apparatus 1200, sends the printing attribute information

10   to the image forming apparatus 1200.

At step S245, the image forming apparatus 1200,

in response to receipt of the printing attribute

information from the image forming apparatus 1000,

internally issues a job creation request command to

15   create a job.

At step S246, the image forming apparatus 1200

sets a printing attribute based on the printing

attribute information.

At step S247, the image forming apparatus 1200

20   send to the image forming apparatus 1000 a page image

request command using the ticket, in which the

determined document type is specified, as a SOAP command.

At step S247-2, the image forming apparatus

1000, in response to receipt of the page image request

25   command from the image forming apparatus 1200, sends to

the image forming apparatus 1200 a page image of the selected document in the format of the document type specified in the ticket. In the page image request command, for example, a plurality of page images of the

5 selected document may be designated. Alternatively, whenever the image forming apparatus 1200 receives each page image from the image forming apparatus 1000, the image forming apparatus 1200 may iteratively send to the image forming apparatus 1000 a page image request

10 command for the next page image.

At step S248, after the image forming apparatus 1200 receives all page images of the selected document from the image forming apparatus 1000, the printing Web service execution part 140 uses the plotter

15 1201 to print out the page images.

At step S248-2, after completion of the printing process, the image forming apparatus 1200 sends to the image forming apparatus 1000 a printing completion message to indicate that the printing process

20 has been terminated.

At step S249, the image forming apparatus 1000, in response to receipt of the printing completion message from the image forming apparatus 1200, displays on the operation panel 1310B a printing completion

25 dialog to indicate that the printing process has been

terminated.

In the image forming apparatus 1200, which
serves as the document receiver apparatus, the SOAP
command creation part 210 of the client part 200 sets
5   request commands sent to the image forming apparatus
1000 as SOAP commands incorporated in messages of HTTP
requests (S241, S244 and S247). The SOAP response
interpretation part 220 of the client part 200 extracts
HTTP responses for process results corresponding to the
10   HTTP requests. Also, the SOAP command analysis part 110
of the server part 100 analyzes request command received
from the image forming apparatus 1000 as SOAP commands,
and determines whether the SOAP commands are document
printing request commands using a ticket.

15   On the other hand, in the image forming
apparatus 1000, which serves as the document transmitter
apparatus, the SOAP command creation part 210B of the
client part 200B sets request commands sent to the image
forming apparatus 1200 as SOAP commands incorporated in
20   messages of HTTP requests (S235, S236 and S240), and the
SOAP response interpretation part 220B of the client
part 200B extracts HTTP responses for process results
corresponding to the HTTP requests. Also, the SOAP
command analysis part 110B of the server part 100B
25   analyzes request commands received from the image

forming apparatus 1200 as SOAP commands.

According to the above-mentioned second document printing process, when a user of the image forming apparatus 1000 having no document process

5   control part 300 selects a document stored in the image forming apparatus 1000, the image forming apparatus 1200 can acquire the document in an appropriate document type from the image forming apparatus 1000 and print out the document by means of the plotter 1201.

10   A description is given, with reference to FIG. 24, of a third document printing process for the above-mentioned third pattern in FIG. 20 according to the second embodiment.

In the third pattern, a selected document

15   stored in the image forming apparatus 1000 is copied to the image forming apparatus 1200 through user's manipulation on the display part 13 of the terminal 30.

FIG. 24 shows an exemplary operation of the third document copying process for the third pattern

20   according to the second embodiment.

Referring to FIG. 24, a user of the terminal 30 selects the image forming apparatus 1000 accommodating a desired document from listed apparatuses, which are displayed on the display part 13, connected to

25   the terminal 30 via the network 15 at step S250.

At step S251, the terminal 30 sends to the image forming apparatus 1000 a document list request command to request a list of documents stored in the image forming apparatus 1000.

5   At step S251-2, the image forming apparatus 1000, in response to receipt of the document list request command from the terminal 30, uses the document management Web service execution part 130B to acquire the document list from HDD 1303B and sends the document 10   list to the terminal 30.

At step S252, the terminal 30, in response to receipt of the document list from the image forming apparatus 1000, sends to the image forming apparatus 1000 a thumbnail request command to request thumbnail 15   data to be displayed on the display panel 13.

At step S252-2, when the image forming apparatus 1000 receives the thumbnail request command from the terminal 30, the document management Web service execution part 130B operates corresponding to 20   the thumbnail request command. Then, the image forming apparatus 1000 uses the document management Web service execution part 130B to acquire the thumbnail data from HDD 1303B and sends the thumbnail data to the terminal 30. For example, the thumbnail data are reduced-size 25   image data of the top pages of documents stored in the

image forming apparatus 1000.

At step S253, when the document list of the image forming apparatus 1000 is displayed in thumbnail representation on the display part 13 of the terminal 30,

5   the user determines which apparatus should print out which document by dragging and dropping a thumbnail of a desired document toward a desired apparatus. In this embodiment, the user drags and drops a document stored · in the image forming apparatus 1000 toward the image

10   forming apparatus 1200.

At step S254, the terminal 30 sends to the image forming apparatus 1000 a bibliographic information request command to request bibliographic information regarding the selected document.

15   At step S254-2, the image forming apparatus 1000, in response to receipt of the bibliographic information request command from the terminal 30, uses the document management Web service execution part 130B to acquire the bibliographic information from HDD 1303B

20   and sends the bibliographic information to the terminal 30.

At step S255, the terminal 30, in response to receipt of the bibliographic information from the image forming apparatus 1000, sends to the image forming

25   apparatus 1200 a system information request command to

request system information regarding the image forming apparatus 1200.

At step S255-2, the terminal 30, in response to receipt of the system information from the image
5   forming apparatus 1200, examines feasibility of the copying process using a ticket.

At step S256, the terminal 30 sends to the image forming apparatus 1200 a printable document type list request command to request a list of document types
10   printable in the image forming apparatus 1200.

At step S256-2, the image forming apparatus 1200, in response to receipt of the printable document type list request command from the terminal 30, sends the printable document type list to the terminal 30.
15   At step S257, the terminal 30 displays a copying or printing confirmation dialog on the display part 13.

When the user chooses OK to start the printing process at step S258, the terminal 30 sends to the image
20   forming apparatus 1000 a ticket request command to request a ticket to use the selected document stored in the image forming apparatus at step S259.

At step S259-2, the image forming apparatus 1000, in response to receipt of the ticket request
25   command from the terminal 30, sends the ticket to the

terminal 30.

At step S260, the terminal 30, in response to receipt the ticket from the image forming apparatus 1000, sends to the image forming apparatus 1200 a document

5 printing request command to acquire the selected document from the image forming apparatus 1000 by authority of the ticket and print out the document.

At step S261, when the image forming apparatus 1200 receives the document printing request command from

10 the terminal 30, the sequence control part 310 of the image forming apparatus 1200 starts the printing process in cooperation with the image forming apparatus 1000. Then, the image forming apparatus 1200 uses the sequence control part 310 to send to the image forming apparatus

15 1000 an acquirable document type list request command to request a list of document types acquirable from the image forming apparatus 1000.

At step S261-2, the image forming apparatus 1000, in response to receipt the acquirable document

20 type list request command from the image forming apparatus 1200, sends the acquirable document type list to the image forming apparatus 1200.

At step S262, the image forming apparatus 1200, in response to receipt of the acquirable document type

25 list from the image forming apparatus 1000, maintains

the acquirable document type list as a transmitter
document type list 302. Furthermore, the sequence
control part 310 of the image forming apparatus 1200
internally issues a writable document type list request
5 command to request a list of document types writable in
the image forming apparatus 1200, and sets the writable
document type list as a receiver document type list 304.

At step S263, the sequence control 310 of the
image forming apparatus 1200 uses the document type
10 determination part 320 to determine whether or not there
is a document type acquirable from the image forming
apparatus 1000 and writable in the image forming
apparatus 1200 based on the transmitter document type
list 302 and the receiver document type list 304, and
15 then determines the best document type. Based on the
determination, if there are a plurality of such document
types, the document type determination part 320
determines one of the document types as the best
document type. If there is no such a document type, the
20 document type determination part 320 determines a
predetermined document type as the best document type.

At step S264, the image forming apparatus 1200
sends to the image forming apparatus 1000 a printing
attribute information request command to request
25 printing attribute information to indicate whether the

selected document should be double-sided printed or single-sided printed.

At step S264-2, the image forming apparatus 1000, in response to receipt of the printing attribute information request command from the image forming apparatus 1200, sends the printing attribute information to the image forming apparatus 1200.

At step S265, the image forming apparatus 1200, in response to receipt of the printing attribute information from the image forming apparatus 1000, internally issues a job creation request command to create a job.

At step S266, the image forming apparatus 1200 sets a printing attribute based on the printing attribute information.

At step S267, the image forming apparatus 1200 sends to the image forming apparatus 1000 the page image request command to request a page image of the selected document in the format of the document type designated in the ticket.

At step S267-2, the image forming apparatus 1000, in response to the page image request command from the image forming apparatus 1200, sends to the image forming apparatus 1200 a page image of the selected document in the format of the designated document type.

In the page image request command, for example, a plurality of page images of the selected document may be designated. Alternatively, whenever the image forming apparatus 1200 receives each page image from the image

5 forming apparatus 1000, the image forming apparatus 1200 may iteratively send to the image forming apparatus 1000 a page image request command for the next page image.

At step S268, when the image forming apparatus 1200 receives all page images of the selected document

10 from the image forming apparatus 1000, the printing Web service execution part 140 uses the plotter 1201 to print out the page images.

At step S268-2, after completion of the printing process, the image forming apparatus 1200 sends

15 to the terminal 30 a printing completion message to indicate that the printing process has been terminated.

At step S269, the terminal 30, in response to receipt of the printing completion message from the image forming apparatus 1200, displays on display part

20 13 a printing completion dialog to indicate that the printing process has been terminated.

In the terminal 30, which serves as an operator apparatus, the SOAP command creation part 210C of the client part 200C sets request commands sent to

25 the image forming apparatuses 1000 and 1200 as SOAP

commands incorporated in messages of HTTP requests (S251, S252, S254, S255, S256, S259 and S260). The SOAP response interpretation part 220C of the client part 200C extracts HTTP responses for process results
5 corresponding to the HTTP requests.

In the image forming apparatus 1000, which serves as the document transmitter apparatus, the SOAP command analysis part 110B of the server part 100B analyzes request commands received from the terminal 30
10 and the image forming apparatus 1200 as SOAP commands, and the document management Web service execution part 130B executes processes corresponding to the HTTP requests. The SOAP response creation part 120B of the server part 100B provides the image forming apparatus
15 1200 and the terminal 30 with process results of the document management Web service execution part 130B as Web services (S251-2, S252-2, S254-2, S259-2, S261-2, S264-2 and S267-2).

On the other hand, in the image forming
20 apparatus 1200, which serves as the document receiver apparatus, the SOAP command creation part 210 of the client part 200 sets request commands sent to the image forming apparatus 1000 as SOAP commands incorporated in messages of HTTP requests (S261, S264 and S267). The
25 SOAP response interpretation part 220 of the client part

200 extracts HTTP responses for process results corresponding to the HTTP requests. Also, the SOAP command analysis part 110 of the server part 100 analyzes received request command as SOAP commands, and

5 the SOAP response creation part 120 of the server part 100 provides the terminal 30 with process results corresponding to the SOAP commands as Web services (S255-2, S256-2 and S268-2).

According to the above-mentioned third

10 document printing process, when a user of the terminal 30 selects a document stored in the image forming apparatus 1000, the image forming apparatus 1200 having the document process control part 300 can acquire the document in an appropriate document type from the image

15 forming apparatus 1000 and print out the document by means of the plotter 1201.

A description is given, with reference to FIG. 25 and FIG. 26, of exemplary screens displayed on the operation panels 1310 and 1310B and the display part 13

20 according to the second embodiment.

FIG. 25 shows an exemplary copying or printing confirmation dialog 420 according to the second embodiment wherein the same components as those shown in FIG. 16 are designated by the same reference numerals

25 and the description thereof is omitted.

Referring to FIG. 25, the copying or printing
confirmation dialog 420 includes a selection area 421 to
select a copying process or a printing process, a detail
setting button 422 to set details of the selected

5   process, a cancel button 423 to cancel the copying
process or the printing process, and an OK button 424 to
start the copying process or the printing process. If a
user selects a document A in the copying manipulation
screen 400 shown in FIG. 16, for example, a message such

10   as "In the image forming apparatus 1200, ◯ copy or ◯
print out the document A." is displayed in the selection
area 421, and the user is prompted to select the copying
process or the printing process on the document A. When
the user selects the printing process, the printing

15   process is displayed as "◎" as illustrated in FIG. 25.

If the user selects the printing process in
the copying or printing confirmation dialog 420 and
further chooses the detail setting button 422, the
terminal 30 displays a printing process detail setting

20   dialog to set details of the printing process as
illustrated in FIG. 26.

FIG. 26 shows an exemplary printing process
detail setting dialog according to the second embodiment
wherein the same components as those shown in FIG. 16

25   are designated by the same reference numerals and the

description thereof is omitted.

Referring to FIG. 26, the printing process detail setting dialog 430 includes a copy number setting area 431 to set the number of copies of a selected

5   document, a printing order setting area 432 to set the printing order of the selected document, a finishing treatment setting area 433 to set a type of finishing treatments, a cancel button 435 to cancel the printing process, and an OK button 435 to start the printing

10   process. In the copy number setting area 431, the user sets the number of copies of a selected document. If the user sets the copy number of the selected document as two or more, the user is allowed to select one of sort printing and stack printing in the printing order

15   setting area 432. For example, if the user selects the sort printing, the sort printing is displayed as "◎" as illustrated in FIG. 26. In addition, the user can select one of "staple" or "punch" as the finishing treatment in the finishing treatment setting area 433.

20   For example, if the user selects "staple", the item "staple" is displayed as "◎" as illustrated in FIG. 26. After the setting, when the user selects the OK button 435, the printing process is executed.

In the first and second embodiment of the

25   present invention, when the image forming apparatus 1200

having the document process control part 300 requests a selected document stored in the image forming apparatus 1000 in the format of a document type that is determined based on document types processable to the image forming

5   apparatuses 1000 and 1200, the corresponding image processing process can be performed in the image forming apparatus 1200 in cooperation with the apparatuses connected to each other via the network. For example, if the size of a document that the image forming

10 apparatus 1000, which serves as the document transmitter apparatus, accommodates is greater than the maximal size of documents that the image forming apparatus 1200, which serves as the document receiver apparatus, can store, the document process control part 300 can use an

15 image scaling function thereof to send a reduced-size page image to the image forming apparatus 1200 based on determination of the document type determination part 320.

Also, since the document process control part

20 300 flexibly controls cooperation with the image forming apparatuses 1000 and 1200 depending on types of processes such as a copying process and a printing process, it is possible to perform various types of processes through cooperation with apparatuses connected

25 via a network.

In the first and second embodiments, the copying process and the printing process that are performed through cooperation with apparatuses connected via a network are described. However, the present

5 invention is not limited to these processes. The present invention is applicable to file management, scanner control and so on. Furthermore, the present invention is applicable to process information regarding the image forming apparatuses 1000 and 1200.

10 Also, the image forming apparatuses 1000 and 1200 and the terminal 30 according to the embodiments are not limited to communication via a fixed line LAN (Local Area Network). In other words, although physical layers differs in a network system, such as a wireless

15 LAN and Bluetooth, SOAP messages can be exchanged in such a network system in accordance with TCP/IP (Transmission Control Protocol/Internet Protocol). Thus, it is possible to implement various processes according to the embodiments as Web services in accordance with

20 http and SOAP. Furthermore, communicated contents are allowed to be extended in a parallel system, such as a centronics and SCSI. Thus, as long as there is agreement between devices that will communicate each other, it is possible to implement message exchange in

25 accordance with SOAP.

A description is given, with reference to the
FIG. 27 through FIG. 40, of a copying process according
to a third embodiment of the present invention.

In the third embodiment, the image forming
5   apparatus 1200 having the document process control part
300 serves as a document transmitter apparatus, and the
image forming apparatus 1000 having no document process
control part 300 serves as a document receiver apparatus,
as illustrated in FIG. 27. Namely, a selected document
10   stored in the image forming apparatus 1200 is copied to
the image forming apparatus 1000 through user's
manipulation.

In the third embodiment, the image forming
apparatus 1200 has the same functional structure and
15   hardware configuration as that according to the first
embodiment. In other words, the image forming apparatus
has the functional structure shown in FIG. 1 and the
hardware configuration shown in FIG. 2. In particular,
the image forming apparatus 1200 having the document
20   process control part 300 has the functional structure
shown in FIG. 4. In addition, the image forming
apparatus 1000 has the same functional structure and
hardware configuration as that according to the first
embodiment. · In other words, the image forming
25   apparatuses 1200 has the functional components shown in

FIG. 1 and the hardware configuration shown in FIG. 2. In particular, the image forming apparatus 1000 having no document process control part 300 has the functional components shown in FIG. 5. Furthermore, the terminal 30 has the same functional structure as that according to the first embodiment. In other words, the terminal 30 has the functional components shown in FIG. 6. For this reason, the description thereof is omitted.

A description is given, with reference to FIG. 27, of how the image forming apparatus 1200 according to the third embodiment provides a Web service to other apparatuses connected via a network.

FIG. 27 shows an exemplary structure of a network system according to the third embodiment. In the illustrated network system, the image forming apparatus 1200, the image forming apparatus 1000, and the terminal 30 are connected to each other via a network 15. The image forming apparatus 1000 does not have to include the document process control part 300 in the document management Web service application 1216 shown in FIG. 1.

Referring to FIG. 27, document data or image data (hereinafter which are collectively referred to as a document) stored in HDD 1303 of the image forming apparatus 1200 are copied to the image forming apparatus

1000 in accordance with illustrated three patterns. In
the illustrative embodiment, the image forming apparatus
1200, which serves as a document transmitter apparatus,
sends a document stored therein to the image forming

5   apparatus 1000. On the other hand, the image forming
apparatus 1000, which serves as a document receiver
apparatus, receives the document from the image forming
apparatus 1200, and the document is copied to the image
forming apparatus 1200 by storing the document in HDD

10 1303B of the image forming apparatus 1000.

In the first pattern according to the third
embodiment, a document stored in the image forming
apparatus 1200 is copied to the image forming apparatus
1000 through user's manipulation on the operation panel

15 1310B of the image forming apparatus 1000. In the
second pattern according to the third embodiment, a
document stored in the image forming apparatus 1200 is
copied to the image forming apparatus 1000 through
user's manipulation on the operation panel 1310 of the

20 image forming apparatus 1200. In the third pattern
according to the third embodiment, a document stored in
the image forming apparatus 1200 is copied to the image
forming apparatus 1000 through user's manipulation on
the display part 13 of the terminal 30.

25   A description is given, with reference to FIG.

28, of a first document copying process for the first pattern shown in FIG. 27 according to the third embodiment.

In the first pattern, a selected document

5   stored in the image forming apparatus 1200 is copied to the image forming apparatus 1000 through user's manipulation on the operation panel 1310 of the image forming apparatus 1200.

FIG. 28 shows an exemplary operation of the

10   first document copying process for the first pattern according to the third embodiment.

Referring to FIG. 28, a user of the image forming apparatus 1000 selects the image forming apparatus 1200 accommodating a desired document from

15   listed apparatuses, which are displayed on the operation panel 1310B, connected to the image forming apparatus 1000 via the network 15 at step S310.

At step S311, the image forming apparatus 1000 sends to the image forming apparatus 1200 a document

20   list request command to request a list of documents stored in the image forming apparatus 1200.

At step S311-2, the image forming apparatus 1200, in response to receipt of the document list request command from the image forming apparatus 1000,

25   uses the document management Web service execution part

130 to acquire the document list from HDD 1303 and sends the document list to the image forming apparatus 1000.

At step S312, the image forming apparatus 1000, in response to receipt of the document list from the image forming apparatus 1200, sends to the image forming apparatus 1200 a thumbnail request command to request thumbnail data to de displayed on the operation panel 1310B.

At step S312-2, when the image forming apparatus 1200 receives the thumbnail request command from the image forming apparatus 1000, the document management Web service execution part 130 operates corresponding to the thumbnail request command. Then, the image forming apparatus 1200 sends to the image forming apparatus 1000 thumbnail data acquired by the document management Web service execution part 130. For example, the thumbnail data are reduced-size image data of the top pages of documents stored in the image forming apparatus 1200.

At step S313, when the document list of the image forming apparatus 1200 is displayed in thumbnail representation on the operation panel 1310B of the image forming apparatus 1000, the user determines which document should be copied to which apparatus by dragging and dropping a thumbnail of a desired document to a

desired apparatus. In this embodiment, the user drags and drops a document stored in the image forming apparatus 1200 toward the image forming apparatus 1000.

At step S314, the image forming apparatus 1000
5 sends to the image forming apparatus 1200 a bibliographic information request command to request bibliographic information regarding the selected document.

At step S314-2, the image forming apparatus
10 1200, in response to receipt of the bibliographic information request command from the image forming apparatus 1000, uses the document management Web service execution part 130 to acquire the bibliographic information from HDD 1303 and sends the bibliographic
15 information to the image forming apparatus 1000.

At step S315, the image forming apparatus 1000, in response to receipt of the bibliographic information from the image forming apparatus 1200, internally acquires system information and examines feasibility of
20 the copying process using a ticket.

At step S316, the image forming apparatus 1000 displays a copying confirmation dialog on the operation panel 1310B.

When the user chooses OK to start the copying
25 process at step S317, the image forming apparatus 1000

internally issues a ticket to write a document in the image forming apparatus 1000, and acquires the ticket at step S318.

At step S319, the image forming apparatus 1000

5   sends to the image forming apparatus 1200 a document writing request command to write a document by authority of the ticket.

At step S320, when the image forming apparatus 1200 receives the document writing request command from

10   the image forming apparatus 1000, the sequence control part 310 starts to control cooperation with the image forming apparatus 1000 to perform the copying process. The image forming apparatus 1200 uses the sequence control part 310 to send to the image forming apparatus

15   1000 an empty file creation request command to create an empty file.

At step S320-2, the image forming apparatus 1000, in response to receipt of the empty file creation request command from the image forming apparatus 1200,

20   creates an empty file and sends the file ID of the empty file to the image forming apparatus 1200.

At step S321, the image forming apparatus 1200, in response to receipt of receipt of the file ID from the image forming apparatus 1000, uses the sequence

25   control part 310 to send to the image forming apparatus

1000 a writable document type list request command to request a list of document types writable in the image forming apparatus 1000.

At step S321-2, the image forming apparatus 1000, in response to receipt of the writable document type list from the image forming apparatus 1200, sends the writable document type list to the image forming apparatus 1200.

At step S322, the image forming apparatus 1200, in response to receipt of the writable document type list from the image forming apparatus 1000, maintains the writable document type list as a receiver document type list 304. Then, the image forming apparatus 1200 uses the sequence control part 310 to internally issue an acquirable document type list request command to request a list of document types acquirable from the image forming apparatus 1200, and maintains the acquirable document type list as a transmitter document type list 302.

At step S323, the sequence control part 310 of the image forming apparatus 1200 uses the document type determination part 320 to determine whether or not there is a document type acquirable from the image forming apparatus 1200 and writable in the image forming apparatus 1000 based on the transmitter document type

list 302 and the receiver document type list 304, and determines the best document type. Based on the determination, if there are a plurality of such document types, the document type determination part 320

5 determines one of the document types as the best document type. If there is no such a document type, the document type determination part 320 determines a predetermined document type as the best document type.

At step S324, the sequence control part 310

10 sends to the image forming apparatus 1000 a page image writing request command to write a page image in the empty file of the image forming apparatus 1000 corresponding to the file ID by authority of the ticket.

At step S325, the image forming apparatus 1000,

15 in response to receipt of the page image from the image forming apparatus 1200, uses the document management Web service execution part 130B to store the page image in the empty file.

At step S325-2, after storing of all page

20 images of the selected document, the image forming apparatus 1000 sends a copying completion message to the image forming apparatus 1200. In the page image writing request command, for example, a plurality of page images of the selected document may be designated.

25 Alternatively, whenever the image forming apparatus 1000

receives each page image from the image forming apparatus 1200, the image forming apparatus 1000 may iteratively store the page image in the identified file.

At step S325-4, the image forming apparatus 1200, in response to receipt of the copying completion message from the image forming apparatus 1000, in turn, sends to the image forming apparatus 1000 a document writing request completion message to indicate that the document writing request command has been fulfilled.

At step S326, the image forming apparatus 1000, in response to receipt of the document writing request completion message from the image forming apparatus 1200, displays a copying completion dialog on the operation panel 1310B.

In the image forming apparatus 1200, which serves as the document transmitter apparatus, the SOAP command creation part 210 of the client part 200 sets request commands sent to the image forming apparatus 1000 as SOAP commands incorporated in messages of HTTP requests (S320, S321 and S324), and the SOAP response interpretation part 220 of the client part 200 extracts HTTP responses for process results corresponding to the HTTP requests.

On the other hand, in the image forming apparatus 1000, which serves as the document receiver

apparatus, the SOAP analysis part 110B of the server part 100B analyzes request commands received from the image forming apparatus 1200 as SOAP commands, and the document management Web service execution part 130B

5 executes processes corresponding to the HTTP requests. The SOAP response creation part 120B of the server part 100B provides process results of the document management Web service execution part 130B as Web services to the image forming apparatus 1200 (S320-2, S321-2 and S325-2).

10 According to the above-mentioned first document copying process for the first pattern shown in FIG. 27, when a user of the image forming apparatus 1000 selects a document stored in the image forming apparatus 1200, the image forming apparatus 1200 having the

15 document process control part 300 can write the document in HDD 1303B of the image forming apparatus 1000 in an appropriate document type.

A description is given, with reference to FIG. 29, of a second document copying process for the above-

20 mentioned second pattern shown in FIG. 27 according to the third embodiment.

In the second pattern, a selected document stored in the image forming apparatus 1200 is copied to the image forming apparatus 1000 through user's

25 manipulation on the operation panel 1310 of the image

forming apparatus 1200.

FIG. 29 shows an exemplary operation of the second document copying process for the second pattern according to the third embodiment.

5   Referring to FIG. 29, a user of the image forming apparatus 1200 selects the image forming apparatus 1200 itself accommodating a desired document from listed apparatuses, which are displayed on the operation panel 1310, connected to the image forming

10   apparatus 1200 via the network 15 at step S330.

At step S331, the image forming apparatus 1200 internally generates a document list request command to request a list of documents stored in the image forming apparatus 1200, and uses the document management Web

15   service execution part 130 to acquire the document list from HDD 1303.

At step S332, the image forming apparatus 1200, in response to receipt of the document list from the document management Web service execution part 130,

20   internally generates a thumbnail request command to request thumbnail data to de displayed on the operation panel 1310, acquires the thumbnail data through the document management Web service execution part 130, and displays thumbnails of individual documents stored in

25   the image forming apparatus 1200 on the operation panel

1310 based on the thumbnail data.

At step S333, when the document list of the image forming apparatus 1200 is displayed in thumbnail representation on the operation panel 1310 of the image

5   forming apparatus 1200, the user determines which document should be copied to which apparatus by dragging and dropping a thumbnail of a desired document toward a desired apparatus. In this embodiment, the user drags and drops a document stored in the image forming

10 apparatus 1200 toward the image forming apparatus 1000.

At step S334, the image forming apparatus 1200 internally generates a bibliographic information request command to request bibliographic information regarding the selected document, and acquires the bibliographic

15 information from HDD 1303 through the document management Web service execution part 130.

At step S335, the image forming apparatus 1200, in response to receipt of the bibliographic information from the document management Web service execution part

20 130, sends to the image forming apparatus 1000 a system information request command to request system information regarding the image forming apparatus 1000.

At step S335-2, the image forming apparatus 1000, in response to receipt of the system information

25 request command from the image forming apparatus 1200,

acquires the system information including ticket information indicative of feasibility of the copying process using a ticket, and sends the system information to the image forming apparatus 1200.

5   At step S336, the image forming apparatus 1000 displays a copying confirmation dialog on the operation panel 1310.

When the user chooses OK to start the copying process at step S337, the image forming apparatus 1200

10   sends to the image forming apparatus 1000 a document writing ticket request command to request a ticket to write a document in the image forming apparatus 1000 at step S338.

At step S338-2, the image forming apparatus

15   1000, in response to receipt of the document writing ticket request command from the image forming apparatus 1200, sends the ticket to the image forming apparatus 1200.

At step S339, the image forming apparatus 1200,

20   in response to receipt of the ticket from the image forming apparatus 1000, internally issues a document writing request command by authority of the ticket.

At step S340, the document process control part 300 of the image forming apparatus 1200 starts to

25   control cooperation with the image forming apparatus

1000 to perform the copying process. The image forming
apparatus 1200 uses the sequence control part 310 to
send to the image forming apparatus 1000 an empty file
creation request command to create an empty file.

5   At step S340-2, the image forming apparatus
1000, in response to receipt of the empty file creation
request command from the image forming apparatus 1200,
creates an empty file and sends the file ID of the empty
file to the image forming apparatus 1200.

10   At step S341, the image forming apparatus 1200,
in response to receipt of receipt of the file ID from
the image forming apparatus 1000, uses the sequence
control part 310 to send to the image forming apparatus
1000 a writable document type list request command to
15   request a list of document types writable in the image
forming apparatus 1000.

          At step S341-2, the image forming apparatus
1000, in response to receipt of the writable document
type list request command from the image forming
20   apparatus 1200, sends the writable document type list to
the image forming apparatus 1200.

          At step S342, the image forming apparatus
1200, in response to receipt of the writable document
type list from the image forming apparatus 1000,
25   maintains the writable document type list as a receiver

document type list 304. Then, the image forming
apparatus 1200 uses the sequence control part 310 to
internally issue an acquirable document type list
request command to request a list of document types

5 acquirable from the image forming apparatus 1200, and
maintains the acquirable document type list as a
transmitter document type list 302.

At step S343, the sequence control part 310 of
the image forming apparatus 1200 uses the document type

10 determination part 320 to determine whether or not there
is a document type acquirable from the image forming
apparatus 1200 and writable in the image forming
apparatus 1000 based on the transmitter document type
list 302 and the receiver document type list 304, and

15 determines the best document type. Based on the
determination, if there are a plurality of such document
types, the document type determination part 320
determines one of the document types as the best
document type. If there is no such a document type, the

20 document type determination part 320 determines a
predetermined document type as the best document type.

At step S344, the sequence control part 310
sends to the image forming apparatus 1000 a page image
writing request command to write a page image in the

25 empty file identified by the file ID by authority of the

ticket.

At step S345, the image forming apparatus 1000, in response to receipt of the page image from the image forming apparatus 1200, uses the document management Web service execution part 130B to store the page image in the identified empty file.

At step S345-2, after storing of all page images of the selected document, the image forming apparatus 1000 sends a copying completion message to the image forming apparatus 1200. In the page image writing request command, for example, a plurality of page images of the selected document may be designated. Alternatively, whenever the image forming apparatus 1000 receives each page image from the image forming apparatus 1200, the image forming apparatus 1000 may iteratively store the page image in the identified file.

At step S346, the image forming apparatus 1200, in response to receipt of the copying completion message from the image forming apparatus 1000, displays a copying completion dialog on the operation panel 1310.

In the image forming apparatus 1200, which serves as the document transmitter apparatus, the SOAP command creation part 210 of the client part 200 sets request commands sent to the image forming apparatus 1000 as SOAP commands incorporated in messages of HTTP

requests (S335, S338, S340, S341 and S344), and the SOAP

response interpretation part 220 of the client part 200

extracts HTTP responses for process results

corresponding to the HTTP requests. Also, the SOAP

5   command analysis part 110 of the server part 100

analyzes request commands received from the image

forming apparatus 1000 as SOAP commands, and determines

whether or not the SOAP commands are document writing

request commands using a ticket.

10   On the other hand, in the image forming

apparatus 1000, which serves as the document receiver

apparatus, the SOAP command creation part 210B of the

client part 200B sets request commands sent to the image

forming apparatus 1200 as SOAP commands incorporated in

15   messages of HTTP requests, the SOAP interpretation part

220B of the client part 200B extracts HTTP responses

indicative of process results corresponding to the HTTP

requests. Also, the SOAP command analysis part 110B of

the server part 100B analyzes request commands received

20   from the image forming apparatus 1200 as SOAP commands.

According to the above-mentioned second

document copying sequence for the second pattern shown

in FIG. 27, when a user of the image forming apparatus

1200 selects a document stored in the image forming

25   apparatus 1200, the image forming apparatus 1200 having

the document process control part 300 can write the document in HDD 1303B of the image forming apparatus 1000 in an appropriate document type.

A description is given, with reference to FIG. 30, of a third document copying process for the above-mentioned third pattern in FIG. 27 according to the third embodiment.

In the third pattern, a selected document stored in the image forming apparatus 1200 is copied to the image forming apparatus 1000 through user's manipulation on the display part 13 of the terminal 30.

FIG. 30 shows an exemplary operation of the third document copying process for the third pattern according to the third embodiment.

Referring to FIG. 30, a user of the terminal 30 selects the image forming apparatus 1200 accommodating a desired document from listed apparatuses, which are displayed on the display part 13, connected to the terminal 30 via the network 15 at step S350.

At step S351, the terminal 30 sends to the image forming apparatus 1200 a document list request command to request a list of documents stored in the image forming apparatus 1200.

At step S351-2, the image forming apparatus 1200, in response to receipt of the document list

request command from the terminal 30, uses the document management Web service execution part 130 to acquire the document list from HDD 1303, and sends the document list to the terminal 30.

5   At step S352, the terminal 30, in response to receipt of the document list from the image forming apparatus 1200, sends to the image forming apparatus 1200 a thumbnail request command to request thumbnail data to be displayed on the display part 13. .

10   At step S352-2, the image forming apparatus 1200, in response to receipt of the thumbnail request command from the terminal 30, uses the document management Web service execution part 130 to operate corresponding to the thumbnail request command. When

15   the image forming apparatus 1200 acquires the thumbnail data through the document management Web service execution part 130, the image forming apparatus 1200 sends the thumbnail data to the terminal 30. Here, the thumbnail data are reduced-size image data of the top

20   pages of documents stored in the image forming apparatus 1200.

          At step S353, when the document list of the image forming apparatus 1200 is displayed in thumbnail representation on the display part 13 of the terminal 30

25   based on the received thumbnail data, the user

determines which document should be copied to which apparatus by dragging and dropping a thumbnail of a desired document toward a desired apparatus. In this embodiment, the user drags and drops a document in the

5　image forming apparatus 1200 toward the image forming apparatus 1000.

At step S354, the terminal 30 sends to the image forming apparatus 1200 a bibliographic information request command to request bibliographic information

10　regarding the selected document.

At step S354-2, the image forming apparatus 1200, in response to receipt of the bibliographic information request command from the terminal 30, uses the document management Web service execution part 130

15　to acquire the bibliographic information from HDD 1303, and sends the bibliographic information to the terminal 30.

At step S355, the terminal 30, in response to receipt of the bibliographic information from the image

20　forming apparatus 1200, sends to the image forming apparatus 1200 a system information request command to request system information.

At step S355-2, the terminal 30, in response to receipt of the system information request command

25　from the image forming apparatus 1200, examines

feasibility of the copying process using a ticket.

At step S356, the terminal 30 displays a copying confirmation dialog on the display part 13.

When the user chooses OK to start the copying
5   process at step S357, the terminal 30 sends to the image forming apparatus 1000 a document writing ticket request command to request a ticket to write a document in the image forming apparatus 1000 at step S358.

At step S358-2, the image forming apparatus
10   1000, in response to receipt of the document writing ticket request command from the terminal 30, sends the ticket to the terminal 30.

At step S359, the terminal 30, in response to receipt of the ticket from the image forming apparatus
15   1000, sends to the image forming apparatus 1200 a document writing request command to write the selected document in the image forming apparatus 1000 by authority of the ticket.

At step S360, when the image forming apparatus
20   1200 receives the document writing request command using the ticket from the terminal 30, the sequence control part 310 of the document process control part 300 starts to control cooperation with the image forming apparatus 1000 to perform the copying process. The image forming
25   apparatus 1200 uses the sequence control part 310 to

send to the image forming apparatus 1000 an empty file
creation request command to create an empty file.

At step S360-2, the image forming apparatus
1000, in response to receipt of the empty file creation
5   request command from the image forming apparatus 1200,
creates an empty file and sends the file ID of the empty
file to the image forming apparatus 1200.

At step S361, the image forming apparatus 1200,
in response to receipt of the file ID from the image
10   forming apparatus 1000, uses the sequence control part
310 to send to the image forming apparatus 1000 a
writable document type list request command to request a
list of document types writable in the image forming
apparatus 1000.

15   At step S361-2, the image forming apparatus
1000, in response to receipt of the writable document
type list request command from the image forming
apparatus 1200, sends the writable document type list to
the image forming apparatus 1200.

20   At step S362, the image forming apparatus 1200,
in response to receipt of the writable document type
list from the image forming apparatus 1000, maintains
the writable document type list as a receiver document
type list 304. Then, the image forming apparatus 1200
25   uses the sequence control part 310 to internally issue

an acquirable document type list request command to request a list of document types acquirable from the image forming apparatus 1200, and maintains the acquirable document type list as a transmitter document

5 type list 302.

At step S363, the sequence control part 310 of the image forming apparatus 1200 uses the document type determination part 320 to determine whether or not there is a document type acquirable from the image forming

10 apparatus 1200 and writable in the image forming apparatus 1000 based on the transmitter document type list 302 and the receiver document type list 304, and determines the best document type. Based on the determination, if there are a plurality of such document

15 types, the document type determination part 320 determines one of the document types as the best document type. If there is no such a document type, the document type determination part 320 determines a predetermined document type as the best document type.

20 At step S364, the sequence control part 310 sends to the image forming apparatus 1000 a page image writing request command to write a page image in the empty file identified by the file ID by authority of the ticket.

25 At step S365, the image forming apparatus 1000,

in response to receipt of the page image from the image
forming apparatus 1200, uses the document management Web
service execution part 130B to store the page image in
the identified empty file.

5   At step S365-2, after storing of all page
images of the selected document, the image forming
apparatus 1000 sends a copying completion message to the
image forming apparatus 1200. In the page image writing
request command, for example, a plurality of page images
10   of the selected document may be designated.
Alternatively, whenever the image forming apparatus 1000
receives each page image from the image forming
apparatus 1200, the image forming apparatus 1000 may
iteratively store the page image in the identified file.

15   At step S365-4, the image forming apparatus
1200, in response of the copying completion message from
the image forming apparatus 1000, sends to the terminal
30 a document writing request completion message to
indicate that the document writing request command has
20   been fulfilled.

At step S366, the terminal 30, in response to
receipt of the document writing request completion
message from the image forming apparatus 1200, displays
a copying completion dialog on the display part 13.

25   In the terminal 30, which serves as an

operator apparatus, the SOAP command creation part 210C
of the client part 200C sets request commands sent to
the image forming apparatus 1000 or 1200 as SOAP
commands incorporated in messages of HTTP requests (S351,

5   S352, S354, S355, S358 and S359), and the SOAP response
interpretation part 220C of the client part 200C
extracts HTTP responses for process results
corresponding to the HTTP requests.

In the image forming apparatus 1000, which

10 serves as the document receiver apparatus, the SOAP
command analysis part 110B of the server part 100B
analyzes received request commands as SOAP commands, and
the document management Web service execution part 130B
executes processes corresponding to the HTTP requests.

15 Then, the SOAP response creation part 120B of the server
part 100 provides process results of the document
management Web service execution part 130B as Web
services to the terminal 30 or the image forming
apparatus 1200 (S335-2, S338-2, S360-2, S361-2 and S365-

20 2).

In the image forming apparatus 1200, which
serves as the document transmitter apparatus, the SOAP
command creation part 210 of the client part 200 sets
request commands sent to the image forming apparatus

25 1000 as SOAP commands incorporated in messages of HTTP

requests (S360, S361 and S364), and the SOAP response interpretation part 220 of the client part 200 extracts HTTP responses for process results corresponding to the HTTP requests. Also, the SOAP command analysis part 110

5 of the server part 100 analyzes received request commands as SOAP commands, and provides process results corresponding to the SOAP commands as Web services to the terminal 30 (S351-2, S352-2, S354-2 and S364-4).

According to the above-mentioned third

10 document copying process for the third pattern shown in FIG. 27, when a user of the terminal 30 selects a document stored in the image forming apparatus 1200, the document can be copied from the image forming apparatus 1200 to the image forming apparatus 1000 by storing the

15 document in HDD 1303B of the image forming apparatus 1000 in an appropriate document type.

A description is given, with reference to FIG. 31 through FIG. 36, of the above-mentioned individual HTTP requests and the corresponding HTTP responses

20 according to the third embodiment.

FIG. 31 shows an exemplary HTTP request for a document writing request command using a ticket according to the third embodiment.

Referring to FIG. 31, a code portion 31

25 indicates a URL to which the HTTP request should be sent

by POST method. For example, the URL "netdoc" is designated in the code portion 31. Furthermore, a code portion 32 indicates a URL to indicate the purpose of the HTTP request. For example, the URL

5 "http://foo.bar.com/netdoc/documentmanagement" is described in the code portion 32 to designate document management as the purpose of the HTTP request.

In a code portion 33, a SOAP header is provided to indicate a root element. In a code portion

10 34, a SOAP body is provided. The code portion 34 includes a code portion 35 ranging from <ns:documentmanagement> to </ns:documentmanagement>. In the code portion 35, a SOAP command to specify a requested process, information referred to for the

15 process and others are described. In the document writing request command using a ticket, a ticket number is specified in a code portion 36 ranging from <ticketId> to </ticketId>, and the SOAP command is specified in a code portion 37 ranging from <operation>

20 to </operation>. For example, "456" and "insertFileByTicket" are designated as the ticket number and the SOAP command, respectively, in the illustration.

FIG. 32 shows an exemplary HTTP response corresponding to the HTTP request shown in FIG. 31

25 according to the third embodiment.

Referring to FIG. 32, a code portion 42 indicates that the HTTP request shown in FIG. 10 has been successfully fulfilled. In a code portion 43, a SOAP header is provided to indicate a root element. In

5   a code portion 44, a SOAP body is provided. The code portion 44 includes a code portion 45 ranging from <ns:documentmanagementResponse> to </ns:documentmanagementResponse>. In the code portion 45, "success" to indicate that the requested process has

10   been successfully terminated is described.

FIG. 33 shows an exemplary HTTP request for a writable document type list request command according to the third embodiment. In FIG. 33, the same code portions as those shown in FIG. 31 are designated by the

15   same reference numerals and the description thereof is omitted.

Referring to FIG. 33, a code portion 34 is the SOAP body of the HTTP request. In a code portion 50 ranging from <operation> to </operation>, a SOAP command

20   "getFileVariation" is designated.

FIG. 34 shows an exemplary HTTP response for the writable document type list request command shown in FIG. 33 according to the third embodiment. In FIG. 34, the same code portions as those shown in FIG. 32 are

25   designated by the same reference numerals and the

description thereof is omitted.

Referring to FIG. 34 a code portion 44 is the SOAP body of the HTTP response. In code portions 52, 53 and 54, each of which ranges from <type> to </type>,

5   three document types writable in the image forming apparatus 1000 are set. In the code portion 52, a compression format of image data is designated as "Tiff" by sandwiching between <format> and </format>. An image type is designated as "1bit/dot" by sandwiching between

10 <imageType> and </imageType>. A resolution is designated as "600×600" by sandwiching between <binary> and </binary>. In the code portion 53, a compression format of image data is designated as "Jpeg" by sandwiching between <format> and </format>. An image

15 type is designated as "8bit/dot" by sandwiching between <imageType> and </imageType>. A resolution is designated as "300×300" by sandwiching between <binary> and </binary>. In the code portion 54, a compression format of image data is designated as "Jpeg2000" by

20 sandwiching between <format> and </format>. An image type is designated as "8bit/dot" by sandwiching between <imageType> and </imageType>. A resolution is designated as "600×600" by sandwiching between <binary> and </binary>.

25   When the image forming apparatus 1200 receives

such an HTTP response, the SOAP response interpretation
part 220 extracts document types from the code portions
52 through 54, and the document types {"Tiff",
"1bit/dot", 600×600), ("Jpeg", "8bit/dot", 300×300} and

5   ("Jpeg2000", "8bit/dot", 600×600) are set as a
transmitter document type list 302. On the other hand,
for example, when the image forming apparatus 1200
acquires document types ("Tiff", "8bit/dot", 600×600)
and ("Jpeg", "8bit/dot", 300×300) by internally issuing

10   an acquirable document type list request command, the
document types ("Tiff", "8bit/dot", 600×600) and
("Jpeg", "8bit/dot", 300×300) are set as a receiver
document type list 304. The document type determination
part 320 determines whether or not there is a document

15   type commonly included in the transmitter document type
list 302 and the receiver document type list 304. In
this example, the document type determination par 320
selects the document type ("Jpeg", "8bit/dot", 300×300),
because only the document type ("Jpeg", "8bit/dot",

20   300×300) is commonly included in the transmitter
document type list 302 and the receiver document type
list 304. The determined document type is set in an
HTTP request as illustrated in FIG. 35.

      FIG. 35 shows an exemplary HTTP request for a

25   page image writing request command according to the

third embodiment. In FIG. 35, the same code portions as those shown in FIG. 31 are designated by the same reference numerals and the description thereof is omitted.

5   Referring to FIG. 35, a code portion 81 indicates that there are a plurality of differently formatted data items in the HTTP request. In code portions 86, "XX_boundary" indicates a boundary between the data items. In a code portion 82, text data

10 information is provided. For example, the text data information may include a text description type, a code type, and the length of the text data. In a code portion 80, a SOAP command is specified by sandwiching between <operation> and </operation>. For example, if

15 "putFile(FileID)" is designated as the SOAP command, a page image is written in a file identified by FileID in the image forming apparatus 1000.

          On the other hand, in a code portion 84, image data information is provided. For example, the image

20 data information may include an image data type, a transferred data type such as "text" or "binary", and the length of the image data. Subsequently, image data 65 are provided. For example, if the data type is "Tiff" and the transferred data type is "binary", the

25 binary Tiff image data 65 are provided.

In order to copy a document stored in the image forming apparatus 1200, the image forming apparatus 1000 extracts the binary Tiff image data from the HTTP request shown in FIG. 35 and stores the image

5   data in HDD 1303B.

FIG. 36 shows an exemplary HTTP response for the page image writing request command shown in FIG. 35 according to the third embodiment. In FIG. 36, the same code portions as those shown in FIG. 31 are designated

10   by the same reference numerals and the description thereof is omitted.

Referring to FIG. 36, in a code portion 87 ranging from <ns:documentmanagementResponse> to </ns:documentmanagementResponse>, a result of the

15   copying process is provided. For example, in a code portion 88, "success" to indicate that the requested process has been successfully terminated is provided by sandwiching between <result> and </result>.

In the above description, the HTTP request

20   incorporating image data is sent to the image forming apparatus 1000. However, the image data may be transmitted and received, for example, in accordance with file transfer protocol (ftp3).

In the third embodiment of the present

25   invention, the following SOAP commands are used.

[Table 2]

SOAP command	Operation
getList	get a document list
getThumbnail	get thumbnail images
getFileInfo	get file bibliographic information
getSystemInfo	get system information
getFileVariation	get an acquirable or writable document type list
getInsertTicket	get a ticket to write (insert) a document
insertFileByTicket	write (insert) document data through a ticket
creatDoc	create an empty document
putFile(FileID)	write a document in a file identified by FileID

These SOAP commands are designated by
sandwiching between <operation> and </operation> in a
SOAP body as described with reference to FIG. 31, FIG.
5   33 and FIG. 35.

A description is given, with reference to FIG.
37 through FIG. 40, of exemplary screens displayed on
the operation panels 1310 and 1310B and the display part
13 according to the third embodiment.

10   FIG. 37 shows an exemplary copying
manipulation screen 400 according to the third
embodiment.

Referring to FIG. 37, the copying manipulation
screen 400 includes an apparatus list display area 401
15   to display a list of apparatuses connected to each other
via the network 15, and a thumbnail display area 402 to

display thumbnails of individual documents stored in an
apparatus selected in the apparatus list display area
401.

In the copying manipulation screen 400, for
5 example, when a user selects the image forming apparatus
1200 as a document transmitter apparatus from listed
apparatuses displayed on the apparatus list display area
401, a list of documents stored in the image forming
apparatus 1200 is displayed in thumbnail representation
10 in the thumbnail display area 402. In the thumbnail
display area 402, the user selects a document A and
further designates the image forming apparatus 1000 as a
document receiver apparatus through user's dragging and
dropping operations by means of an arrow 403, as
15 illustrated in FIG. 37. At this time, the user may
select a plurality of documents.

When the user designates the image forming
apparatus 1000 as the document receiver apparatus
through the dragging and dropping operations, a copying
20 confirmation dialog is displayed so that the user can
confirm the copying process as illustrated in FIG. 38.

FIG. 38 shows an exemplary copying
confirmation dialog 410 according to the third
embodiment.

25 Referring to FIG. 38, the copying confirmation

dialog 410 includes a message display area 411 to
display a message to the user, a cancel button 412 to
cancel the copying process, and an OK button 413 to
start the copying process.

5   For example, if the user selects a plurality
of documents A, B, C and D in the copying manipulation
screen 400 shown in FIG. 37, a message such as "May the
documents A, B, C and D be copied to the image forming
apparatus 1000?" is displayed in the message display
10   area 411 so that the user can confirm the selected
documents and apparatus.

Then, when the user chooses the OK button 413
in the copying confirmation dialog 410, a plural
document copying mode setting dialog to set a copying
15   mode of the plurality of documents as illustrated in FIG.
39. On the other hand, for example, if the user selects
only the document A in the copying manipulation screen
400 shown in FIG. 37, the user can start execution of
the copying process by choosing the OK button 413 in the
20   copying confirmation dialog 410 shown in FIG. 37.

FIG. 39 shows an exemplary plural document
copying mode setting dialog 440 according to the third
embodiment.

Referring to FIG. 39, the plural document
25   copying mode setting dialog 440 includes a copying mode

selection area 441 to select a copying mode, a copying
order setting button 442 to set a copying order of the
documents, a cancel button 443 to cancel the copying
process, and an OK button 444 to start the copying

5   process.

In the copying mode selection area 441, a
message such as "Copy the selected documents as ○
separate documents ○ a single document." is displayed.
When the user chooses one of the two options, the

10 selected option is displayed as ◎. In the illustrative
example, the user selects "a single document". In
addition, when the user selects the copying order
setting button 442 to designate a copying order of the
documents, a plural document copying order setting

15 dialog is displayed as illustrated in FIG. 40.

FIG. 40 shows an exemplary plural document
copying order setting dialog 450 according to the third
embodiment.

Referring to FIG. 40, the plural document

20 copying order setting dialog 450 includes a selected
document list display area 451 to display a list of
documents selected by the user, an UP button 452 to
ascend the copying order of a document, a DOWN button
453 to descend the copying order of a document, a cancel

25 button 454 to cancel the copying process, and an OK

button 455 to start the copying process.

In the plural document copying order setting dialog 450, if the user wants to ascend the copying order of the document B, the user first selects the

5   document B in the selected document list display area 451 and then chooses the UP button. As a result, the document B can be copied before the document A. In contrast, if the user chooses the DOWN button 453, the document B can be copied after the document C or the

10   document D. After setting the copying order, if the user chooses the OK button 455, the copying process is started, and the documents A through D are copied from the image forming apparatus 1200 to the image forming apparatus 1000 in the designated copying order.

15   In the third embodiment of the present invention, if the image forming apparatus 1200 having the document process control part 300 requests the image forming apparatus 1000 to write a selected document, which is stored in the image forming apparatus 1200, in

20   HDD 1303B of the image forming apparatus 1000 in the format of a document type processable to the image forming apparatuses 1000 and 1200, the image forming apparatuses 1000 and 1200 can properly cooperate corresponding to the request via the network 15.

25   For example, if the size of a selected

document that the image forming apparatus 1200, which

serves as the document transmitter apparatus,

accommodates is greater than the maximal size of

documents that the image forming apparatus 1000, which

5   serves as the document receiver apparatus, can store,

the document process control part 300 can use an image

scaling function thereof to send a reduced-size page

image to the image forming apparatus 1000 based on

determination of the document type determination part

10   320.

Also, since the document process control part

300 flexibly controls cooperation with the image forming

apparatuses 1000 and 1200 depending on types of

processes such as a copying process and a printing

15   process, it is possible to perform various types of

processes by properly coordinating apparatuses connected

to each other via a network.

In the third embodiment, apparatuses connected

to each other via a network cooperate to perform a

20   copying process. However, the present invention is not

limited to such a copying process. The present

invention is applicable to file management, scanner

control, and so on. In addition, the present invention

is applicable to processing of information regarding the

25   image forming apparatuses 1000 and 1200.

Also, the image forming apparatuses 1000 and 1200 and the terminal 30 according to the embodiment are not limited to communication via a fixed line LAN (Local Area Network). In other words, although physical layers

5 differs in a network system, such as a wireless LAN and Bluetooth, SOAP messages can be exchanged in such a network system in accordance with TCP/IP (Transmission Control Protocol/Internet Protocol). Thus, it is possible to implement various processes according to the

10 embodiment as Web services in accordance with http and SOAP. Furthermore, communicated contents are allowed to be extended in a parallel system, such as a centronics and SCSI. Thus, as long as there is agreement between devices that will communicate each other, it is possible

15 to implement message exchange in accordance with SOAP.

A description is given, with reference to the FIG. 41 through FIG. 53, of a copying process according to a fourth embodiment of the present invention.

In the fourth embodiment, the terminal 30 has

20 the document process control part 300, which plays central role in cooperation with the image forming apparatuses 1000 and 1200 to perform a copying process.

A description is given, with reference to FIG. 41, of how the terminal 30 having the document process

25 control part 300 according to the fourth embodiment

provides a Web service to other apparatuses connected via a network.

FIG. 41 shows an exemplary structure of a network system according to the fourth embodiment. In the illustrated network system, the image forming apparatus 1200, the image forming apparatus 1000, and the terminal 30 are connected to each other via a network 15. The image forming apparatus 1200 having no document process control part 300 serves as a document receiver apparatus. The image forming apparatus 1000 having no document process control part 300 serves as a document transmitter apparatus. The terminal 30 has the document process control part 300. In the fourth embodiment, the image forming apparatuses 1000 and 1200 has the same functional structures and hardware configurations as described in detail below.

Referring to FIG. 41, document data or image data (hereinafter which are collectively referred to as a document) stored in HDD 1303 of the image forming apparatus 1200 are copied to the image forming apparatus 1000 in accordance with illustrated three patterns. In the illustrative embodiment, the image forming apparatus 1000, which serves as a document transmitter apparatus, sends a document stored therein to the image forming apparatus 1200. On the other hand, the image forming

apparatus 1200, which serves as a document receiver apparatus, receives the document from the image forming apparatus 1000, and the document is copied to the image forming apparatus 1200 by storing the document in HDD

5   1303 of the image forming apparatus 1200.

A description is given, with reference to FIG. 42 and FIG. 43, of functional structures of the image forming apparatuses 1000 and 1200 and the terminal 30 according to the fourth embodiment.

10   FIG. 42 shows exemplary functional structures of the image forming apparatuses 1000 and 1200 having no document process control part 300 according to the fourth embodiment. In FIG. 42, only primary functional components of the image forming apparatuses 1000 and

15   1200 shown in FIG. 1 are illustrated and the other functional components are omitted.

Referring to FIG. 42, the document management Web service application 1216 of the image forming apparatus 1200 comprises a server part 100, a document

20   management Web service execution part (WSF) 130, and a client part 200.

The server part 100 controls message exchanges in accordance with SOAP. The document management Web service execution part 130, which serves as a Web

25   service function (WSF) to provide Web services, manages

documents by accessing HDD 1303 accommodating the documents. The client part 200 exchanges SOAP messages to request and provide Web services.

The server part 100 comprises a SOAP command
5   analysis part 110 and a SOAP response creation part 120. The SOAP command analysis part 110 analyzes SOAP commands incorporated in HTTP requests. The SOAP response creation part 120creates responses corresponding to the SOAP commands as SOAP messages
10   incorporated in HTTP responses.

When the image forming apparatus 1200 receives an HTTP request, the SOAP command analysis part 110 analyzes a SOAP command incorporated in an HTTP request, and informs the document management Web service
15   execution part 130 what Web service the document management Web service execution part 130 should execute. In response to receipt of the notification from the SOAP command analysis part 110, for example, the document management Web service execution part 130 stores a
20   processed document processed in HDD 1303, updates and deletes a document stored in HDD 1303, and acquires bibliographic information regarding a document stored in HDD 1303.

The SOAP response creation part 120, depending
25   on notification from the SOAP command analysis part 130,

receives a process result of the document management Web

service execution part 130 from the document management

Web service execution part 130, generates a SOAP message

to indicate the process result, and uses httpd 2 of NCS

5   1228 to send the message as an HTTP response to the

network 15.

The client part 200 comprises a SOAP command

creation part 210 and a SOAP response interpretation

part 220. The SOAP command creation part 210 generates

10   SOAP messages indicative of process requests in such a

way that the SOAP messages are incorporated in an HTTP

request. The SOAP response interpretation part 220

interprets SOAP messages incorporated in received HTTP

responses.

15   The image forming apparatus 1000 according to

the fourth embodiment has the same functional structure

as that of the image forming apparatus 1200, and the

description thereof is omitted. In FIG. 41, the same

functional components of the image forming apparatus

20   1000 as those of the image forming apparatus 1200 are

designated by the same reference numerals followed by

the capital letter "B".

A description is given, with reference to FIG.

43, of a functional structure of the terminal 30 having

25   the document process control part 300 according to the

fourth embodiment.

FIG. 43 shows an exemplary functional structure of the terminal 30 having the document process control part 300 according to the fourth embodiment.

5   Referring to FIG. 43, the terminal 30, which is a personal computer controlled by CPU, comprises a network control part 330 to control communication to other apparatuses connected via the network 15 in accordance with HTTP, a client part 200C to control

10   message exchanges in accordance with SOAP, an I/O control part 340 to control inputs and outputs of data from/to a user, a display part 13 to display data supplied from the I/O control part 340, and a document process control part 300 to control a document copying

15   process to copy a document from the image forming apparatus 1000 to the image forming apparatus 1200 in response to a user's request to copy the document.

In the terminal 30, a user selects a target document to be copied from listed documents, which are

20   displayed on the display part 13, stored in the image forming apparatus 1000 by means of an input device (not illustrated) such as a mouse or a keyboard, and then designates the image forming apparatus 1200 as an apparatus to which the selected document should be

25   copied. When the user inputs data, the I/O control part

340 sends the data to the SOAP command creation part
210C. Based on the data received from the I/O control
part 340, the SOAP command creation part 210C generates
a SOAP command to copy the selected document from the
5   image forming apparatus 1000 to the image forming
apparatus 1200, and sends the SOAP command to the
network control part 330. The network control part 330
sends the SOAP command as an HTTP request to the image
forming apparatus 1200.

10   The network control part 330, in response to
receipt of an HTTP response from the image forming
apparatus 1200, sends the HTTP response to the SOAP
response interpretation part 220C of the client part
200C. The SOAP response interpretation part 220C
15   extracts a process result from the HTTP response, and
sends the process result to the I/O control part 340 so
as to display the process result on the display part 13.
The I/O control part 340 displays the process result on
the display part 13.

20   The document management control part 300
comprises a sequence control part 310 and a document
type determination part 320. The sequence control part
310 controls a sequence of processes to copy a document
stored in the image forming apparatus 1000 to the image
25   forming apparatus 1200. The document type determination

part 320 determines what document type processable to the image forming apparatuses 1000 and 1200.

The sequence control part 310, when the user selects a copying process in a screen displayed on the display part 13, instructs the SOAP command creation part 210C to send to the image forming apparatus 1000 an acquirable document type list request command to request a list of document types acquirable from the image forming apparatus 1000. Furthermore, the sequence control part 310 instructs the SOAP command creation part 210C to send to the image forming apparatus 1200 a writable document type list request command to request a list of document types writable in the image forming apparatus 1200.

The sequence control part 310, in response to receipt of the acquirable document type list and the writable document type list from the SOAP response interpretation part 220, requests the document type determination part 320 to determine a document type processable to the image forming apparatuses 1000 and 1200. Then, the sequence control part 310 sends to the SOAP command creation part 210C a copying request command to copy a selected document from the image forming apparatus 1000 to the image forming apparatus 1200 in the format of the determined document type, and

displays on the display part 13 a copying completion

dialog to indicate completion of the copying process

depending on a response corresponding to the copying

request.

5   The document type determination part 320

determines whether or not there is a document type

processable to both the image forming apparatuses 1000

and 1200 based on a transmitter document type list 302,

which includes document types acquirable from the image

10   forming apparatus 1000, and a receiver document type

list 304, which includes document types writable in the

image forming apparatus 1200, and determines the best   .

document type. The document type determination part 320

informs the sequence control part 310 of the best

15   document type.

A description is given, with reference to FIG.

44, of a PULL type document copying process according to

the fourth embodiment.

In the PULL type document copying process, the

20   image forming apparatus 1200, in response to receipt of

a document copying request from a user of the terminal

30, acquires a designated document from the image

forming apparatus 1000 and stores the document in HDD

1303.

25   FIG. 44 shows an exemplary operation of the

PULL type document copying process according to the fourth embodiment.

Referring to FIG. 44, a user of the terminal 30 selects the image forming apparatus 1000

5　accommodating a desired document from listed apparatuses, which are displayed on the display part 13, connected to the terminal 30 via the network 15 at step S410.

At step S411, the terminal 30 sends to the image forming apparatus 1000 a document list request

10　command to request a list of documents stored in the image forming apparatus 1000.

At step S411-2, the image forming apparatus 1000, in response to receipt of the document list request command from the terminal 30, uses the document

15　management Web service execution part 130B to acquire the document list from HDD 1303B and sends the document list to the terminal 30.

At step S412, the terminal 30, in response to receipt of the document list from the image forming

20　apparatus 1000, sends to the image forming apparatus 1000 a thumbnail request command to request thumbnail data to de displayed on the display part 13.

At step S412-2, when the image forming apparatus 1000 receives the thumbnail request command

25　from the terminal 30, the document management Web

service execution part 130B operates corresponding to the thumbnail request command. Then, the image forming apparatus 1000 sends to the terminal 30 the thumbnail data acquired by the document management Web service

5   execution part 130B. For example, the thumbnail data are reduced-size image data of the top pages of documents stored in the image forming apparatus 1000.

At step S413, when the document list of the image forming apparatus 1000 is displayed in thumbnail

10 representation on the display part 13 of the terminal 30, the user determines which document should be copied to which apparatus by dragging and dropping a thumbnail of a desired document toward a desired apparatus. In this embodiment, the user drags and drops a document stored

15 in the image forming apparatus 1000 toward the image forming apparatus 1200.

At step S414, the terminal 30 sends to the image forming apparatus 1000 a bibliographic information request command to request bibliographic information

20 regarding the selected document.

At step S414-2, the image forming apparatus 1000, in response to receipt of the bibliographic information request command from the terminal 30, uses the document management Web service execution part 130B

25 to acquire the bibliographic information from HDD 1303B

and sends the bibliographic information to the terminal 30.

At step S415, the terminal 30, in response to receipt of the bibliographic information from the image forming apparatus 1000, sends to the image forming apparatus 1000 a system information request command to request system information regarding the image forming apparatus 1000.

At step S415-2, the image forming apparatus 1000, in response to receipt of the system information request command from the terminal 30, sends the system information to the terminal 30.

At step S416, the terminal 30, in response to receipt of the system information from the image forming apparatus 1000, examines feasibility of the copying process using a ticket based on the system information. Then, the terminal 30 sends to the image forming apparatus 1200 a system information request command to request system information regarding the image forming apparatus 1200.

At step S416-2, the image forming apparatus 1200, in response to receipt of the system information request command from the terminal 30, sends the system information to the terminal 30.

At step S417, the terminal 30, in response to

receipt of the system information from the image forming apparatus 1200, examines feasibility of the copying process using a ticket based on the system information. Then, the terminal 30 displays a copying confirmation

5 dialog on the display part 13.

When the user chooses OK to start the copying process at step S418, the terminal 30 sends to the image forming apparatus 1000 an acquirable document type list request command to request a list of document types

10 acquirable from the image forming apparatus 1000 at step S419.

At step S419-2, the image forming apparatus 1000, in response to receipt of the acquirable document type list request command from the terminal 30, sends

15 the acquirable document type list to the terminal 30.

At step S420, the terminal 30, in response to receipt of the acquirable document type list from the image forming apparatus 1000, maintains the acquirable document type list as a transmitter document type list

20 302. Furthermore, the terminal 30 sends to the image forming apparatus 1200 a writable document type list request command to request a list of document types writable in the image forming apparatus 1200.

At step S420-2, the image forming apparatus

25 1200, in response to receipt of the writable document

type list request command from the terminal 30, sends the writable document type list to the terminal 30.

At step S421, the terminal 30, in response to receipt of the writable document type list from the image forming apparatus 1200, maintains the writable document type list as a receiver document type list 304. Then, the sequence control part 310 of the terminal 30 uses the document type determination part 320 to determine whether or not there is a document type acquirable from the image forming apparatus 1000 and writable in the image forming apparatus 1200 based on the transmitter document type list 302 and the receiver document type list 304, and determines the best document type. Based on the determination, if there are a plurality of such document types, the document type determination part 320 determines one of the document types as the best document type. If there is no such a document type, the document type determination part 320 determines a predetermined document type as the best document type.

At step S422, the terminal 30 sends to the image forming apparatus 1000 a ticket request command to request a ticket to use the selected document stored in the image forming apparatus 1000. Here, the determined document type is included in the ticket request command.

At step S422-2, the image forming apparatus 1000, in response to receipt of the ticket request command from the terminal 30, sends the ticket to the terminal 30.

5 At step S423, the terminal 30, in response to receipt of the ticket from the image forming apparatus 1000, sends to the image forming apparatus 1200 a document copying request command to copy the selected document from the image forming apparatus 1000 to the 10 image forming apparatus 1200 by authority of the ticket.

At step S424, the image forming apparatus 1200, in response to receipt of the document copying request command from the terminal 30, sends to the image forming apparatus 1000 a page image request command to request a 15 page image of the selected document in the format of the document type designated in the ticket. In the page image request command, for example, a plurality of page images of the selected document may be designated. Alternatively, whenever the image forming apparatus 1200 20 receives each page image from the image forming apparatus 1000, the image forming apparatus 1200 may send to the image forming apparatus 1000 a page image request command for the next page image.

At step S425, the image forming apparatus 1200 25 stores the page image received from the image forming

apparatus 1000 in HDD 1303.

At step S425-2, after storing of all page images of the selected document in HDD 1303, the image forming apparatus 1200 sends to the terminal 30 a

5   document copying request completion message to indicate that the document copying request has been fulfilled.

At step S426, the terminal 30, in response to receipt of the document copying request completion message from the image forming apparatus 1200, displays

10 · on the display part 13 a copying completion dialog to indicate that the copying process has been terminated.

In the terminal 30, which serves as an operator apparatus, the SOAP command creation part 210C of the client part 200C sets request commands sent to

15   the image forming apparatuses 1000 and 1200 as SOAP commands incorporated in messages of HTTP requests (S411, S412, S414, S415, S416, S419, S420, S422 and S423). The SOAP interpretation part 220C of the client part 200C extracts HTTP responses for process results

20   corresponding to the HTTP requests.

In the image forming apparatus 1000, which serves as the document transmitter apparatus, the SOAP command analysis part 110B of the server part 100B analyzes received request commands as SOAP commands, and

25   the document management Web service execution part 130B

performs processes corresponding to the SOAP commands.
The SOAP response creation part 120B of the server part
100B provides the terminal 30 with process results of
the document management Web service execution part 130B

5   as Web services (S411-2, S412-2, S414-2, S415-2, S419-2
and S422-2).

On the other hand, in the image forming
apparatus 1200, which serves as the document receiver
apparatus, the SOAP command creation part 210 of the

10 client part 200 sets request commands sent to the image
forming apparatus 1000 as SOAP commands incorporated in
messages of HTTP requests (S424). The SOAP response
interpretation part 220 of the client part 200 extracts
HTTP responses for process results corresponding to the

15 HTTP requests. Also, the SOAP command analysis part 110
of the server part 100 analyzes received request
commands as SOAP commands, and the SOAP response
creation part 120 of the server part 100 provides
process results corresponding to the SOAP command as Web

20 services to the terminal 30 (S425-2).

According to the above-mentioned PULL type
document copying process, when a user of the terminal 30
having the document process control part 300 selects a
document stored in the image forming apparatus 1000, the

25 document can be copied from the image forming apparatus

1000 to the image forming apparatus 1200 by storing the
document in HDD 1303 of the image forming apparatus 1200
in an appropriate document type.

A description is given, with reference to FIG.
5   45 through FIG. 50, of the above-mentioned individual
request commands according to the fourth embodiment.

FIG. 45 shows an exemplary HTTP request for an
acquirable document type list request command according
to the fourth embodiment.

10   Referring to FIG. 45, a code portion 31
indicates a URL to which the HTTP request should be sent
by POST method. For example, the URL "netdoc" is
designated in the code portion 31. Furthermore, a code
portion 32 shows a URL to indicate the purpose of the
15   HTTP request. For example, the URL
"http://foo.bar.com/netdoc/documentmanagement" is
described in the code portion 32 to designate document
management as the purpose of the HTTP request.

In a code portion 33, a SOAP header is
20   provided to indicate a root element. In a code portion
34, a SOAP body is provided. The code portion 34
includes a code portion 35 ranging from
<ns:documentmanagement> to </ns:documentmanagement>. In
the code portion 35, a SOAP command to specify a
25   requested process, information referred to for the

process and others are described. In a code portion 50
in the SOAP body, a SOAP command "getFileVariation" is
designated by sandwiching between <operation> and
</operation>.

5   FIG. 46 shows an exemplary HTTP response
corresponding to the HTTP request shown in FIG. 45.

    Referring to FIG. 46, a code portion 44 is the
SOAP body of the HTTP response. In code portions 52, 53
and 54, each of which ranges from <type> to </type>,
10 three document types acquirable from the image forming
apparatus 1000 are set. In the code portion 52, a
compression format of image data is designated as "Tiff"
by sandwiching between <format> and </format>. An image
type is designated as "1bit/dot" by sandwiching between
15 <imageType> and </imageType>. A resolution is
designated as "600×600" by sandwiching between <binary>
and </binary>. In the code portion 53, a compression
format of image data is designated as "Jpeg" by
sandwiching between <format> and </format>. An image
20 type is designated as "8bit/dot" by sandwiching between
<imageType> and </imageType>. A resolution is
designated as "300×300" by sandwiching between <binary>
and </binary>. In the code portion 54, a compression
format of image data is designated as "Jpeg2000" by
25 sandwiching between <format> and </format>. An image

type is designated as "8bit/dot" by sandwiching between
<imageType> and </imageType>. A resolution is
designated as "600×600" by sandwiching between <binary>
and </binary>.

5   When the terminal 30 receives such an HTTP
response, the SOAP response interpretation part 220C
extracts document types from the code portions 52
through 54, and the document types ("Tiff", "1bit/dot",
600×600), ("Jpeg", "8bit/dot", 300×300) and ("Jpeg2000",
10   "8bit/dot", 600×600) are set as a transmitter document
type list 302. On the other hand, when the terminal 30
receives document types ("Tiff", "8bit/dot", 600×600)
and ("Jpeg", "8bit/dot", 300×300), the document types
("Tiff", "8bit/dot", 600×600) and ("Jpeg", "8bit/dot",
15   300×300) are set as a receiver document type list 304.
The document type determination part 320 determines
whether or not there is a document type commonly
included in the transmitter document type list 302 and
the receiver document type list 304. In this example,
20   the document type determination part 320 selects the
document type ("Jpeg", "8bit/dot", 300×300), because
only the document type ("Jpeg", "8bit/dot", 300×300) is
commonly included in the transmitter type list 302 and
the receiver document type list 304. The determined
25   document type is set in an HTTP request as shown in FIG.

49 described below.

FIG. 47 shows an exemplary HTTP request for a document copying request command according to the fourth embodiment. In FIG. 47, the same code portion as those shown in FIG. 45 are designated by the same reference numerals and the description thereof is omitted.

Referring to FIG. 47, a code portion 31 indicates a URL to which the HTTP request should be sent by POST method. For example, the URL "netdoc" is written in the code portion 31. Furthermore, a code portion 32 shows a URL to indicate the purpose of the HTTP request. For example, the URL "http://foo.bar.com/netdoc/documentmanagement" is described in the code portion 32 to designate document management as the purpose of the HTTP request.

In a code portion 33, a SOAP header is provide to indicate a root element. In a code portion 34, a SOAP body is provided. The code portion 34 includes a code portion 35 ranging from <ns:documentmanagement> to </ns:documentmanagement>. In the code portion 34, a SOAP command to specify a requested process, information referred to for the process and others are provided. In the document copying request command using a ticket, a ticket number is specified in a code portion 36 ranging from <ticketId> to </ticketId>, and a SOAP command is

specified in a code portion 37 ranging from <operation>
to </operation>. For example, "456" and
"insertFileByTicket" are designated as the ticket number
and the SOAP command, respectively, in the illustration.

5   FIG. 48 shows an exemplary HTTP response
corresponding to the HTTP request shown in FIG. 47
according to the fourth embodiment. In FIG. 48, the
same code portions as those shown in FIG. 46 are
designated by the same reference numerals and the

10   description thereof is omitted.

        Referring to FIG. 48, a code portion 42
indicates that the HTTP request shown in FIG. 47 has
been successfully fulfilled. In a code portion 43, a
SOAP header is provided to indicate a root element. In

15   a code portion 44, a SOAP body is provided. The code
portion 44 includes a code portion 45 ranging from
<ns:documentmanagementResponse> to
</ns:documentmanagementResponse>. In the code portion
45, "success" to indicate that the requested process has

20   been successfully terminated is described.

        FIG. 49 shows an exemplary HTTP request for a
page image request command according to the fourth
embodiment. In FIG. 49, the same code portions as those
shown in FIG. 45 are designated by the same reference

25   numerals and the description thereof is omitted.

Referring to FIG. 49, a code portion 34 is the SOAP body of the HTTP request. In a code portion 59, the document type is specified by sandwiching between <type> and </type>. In a code portion 60, the SOAP

5 command is specified by sandwiching between <operation and </operation>. For example, the document type ("Jpeg", "8bit/dot", 300×300), which is designated in the code portion 53 in FIG. 46, may be designated provided in the HTTP response. Also,

10 "getFile(TicketID)" is specified as the SOAP command in the code portion.

FIG. 50 shows an exemplary HTTP response corresponding to the HTTP request shown in FIG. 49 according to the fourth embodiment. In FIG. 50, the

15 same code portions as those shown in FIG. 46 are designated by the same reference numerals and the description thereof is omitted.

Referring to FIG. 50, a code portion 61 indicates that there are a plurality of differently

20 formatted data items in the HTTP response. In a code portion 66, "XX_boundary" indicates a boundary between the data item. In a code portion 62, text data information is provided. For example, the text data information may include a text description type, a code

25 type and the length of the text data. In a code portion

63, "success" to indicate that the page image request command has been successfully fulfilled is provided by sandwiching between <result> and </result>.

On the other hand, in a code portion 64, image data information is provided. For example, the image data information may include an image data type, a transferred data type such as "text" or "binary", and the length of the image data. Subsequently, image data 65 are provided. For example, if the data type is "Tiff" and the transferred data type is "binary", the binary Tiff image data 65 are provided.

In order to copy a document stored in the image forming apparatus 1000, the image forming apparatus 1200 extracts the binary Tiff image data from the HTTP response shown in FIG. 50 and stores the image data in HDD 1303.

In the above description, the HTTP request incorporating image data is sent to the image forming apparatus 1200. However, the image data may be transmitted and received, for example, in accordance with file transfer protocol (ftp3).

In the PULL type document copying sequence according to the fourth embodiment of the present invention, the following SOAP commands are used.

[Table 3]

SOAP command	Operation
getList	get a document list
getThumbnail	get thumbnail images
getFileInfo	get file bibliographic information
getSystemInfo	get system information
getFileVariation	get an acquirable or writable document type list
getCopyTicket	get a ticket to copy a document
copyFileByTicket	copy document data by a ticket
getFile(TicketID)	get a document corresponding to a ticket ID

These SOAP commands are designated by
sandwiching between <operation> and </operation> in a
SOAP body as described with reference to FIG. 45, FIG.
47 and FIG. 49.

5   A description is given, with reference to FIG.
51, of a PUSH type document copying process according to
the fourth embodiment.

In the PUSH type document copying process, the
image forming apparatus 1000, in response to receipt of
10   a document writing request from a user of the terminal
30, sends to the image forming apparatus 1200 an HTTP
request, which includes a designated document, to
request the image forming apparatus 1200 to store the
attached document in HDD 1303.

15   FIG. 51 shows an exemplary operation of the
PUSH type document copying process according to the

fourth embodiment.

Referring to FIG. 51, a user of the terminal 30 selects the image forming apparatus 1000 accommodating a desired document from listed apparatuses,

5   which are displayed on the display part 13, connected to the terminal 30 via the network 15 at step S430.

At step S431, the terminal 30 sends to the image forming apparatus 1000 a document list request command to request a list of documents stored in the

10   image forming apparatus 1000.

At step S431-2, the image forming apparatus 1000, in response to receipt of the document list request command from the terminal 30, uses the document management Web service execution part 130B to acquire

15   the document list from HDD 1303B and sends the document list to the terminal 30.

At step S432, the terminal 30, in response to receipt of the document list from the image forming apparatus 1000, sends to the image forming apparatus

20   1000 a thumbnail request command to request thumbnail data to de displayed on the display part 13.

At step S432-2, when the image forming apparatus 1000 receives the thumbnail request command from the terminal 30, the document management Web

25   service execution part 130B operates corresponding to

the thumbnail request command. Then, the image forming
apparatus 1000 sends to the terminal 30 the thumbnail
data acquired by the document management Web service
execution part 130B. For example, the thumbnail data

5 are reduced-size image data of the top pages of
documents stored in the image forming apparatus 1000.

At step S433, when the document list of the
image forming apparatus 1000 is displayed in thumbnail
representation on the display part 13 of the terminal 30,

10 the user determines which document should be copied to
which apparatus by dragging and dropping a thumbnail of
a desired document toward a desired apparatus. In this
embodiment, the user drags and drops a document stored
in the image forming apparatus 1000 toward the image

15 forming apparatus 1200.

At step S434, the terminal 30 sends to the
image forming apparatus 1000 a bibliographic information
request command to request bibliographic information
regarding the selected document.

20 At step S434-2, the image forming apparatus
1000, in response to receipt of the bibliographic
information request command from the terminal 30, uses
the document management Web service execution part 130B
to acquire the bibliographic information from HDD 1303B

25 and sends the bibliographic information to the terminal

30.

At step S435, the terminal 30, in response to receipt of the bibliographic information from the image forming apparatus 1000, sends to the image forming apparatus 1000 a system information request command to request system information regarding the image forming apparatus 1000.

At step S435-2, the image forming apparatus 1000, in response to receipt of the system information request command from the terminal 30, sends the system information to the terminal 30.

At step S436, the terminal 30, in response to receipt of the system information from the image forming apparatus 1000, examines feasibility of the copying process using a ticket based on the system information. Then, the terminal 30 sends to the image forming apparatus 1200 a system information request command to request system information regarding the image forming apparatus 1200.

At step S436-2, the image forming apparatus 1200, in response to receipt of the system information request command from the terminal 30, sends the system information to the terminal 30.

At step S437, the terminal 30, in response to receipt of the system information from the image forming

apparatus 1200, examines feasibility of the copying

process using a ticket based on the system information.

Then, the terminal 30 displays a copying confirmation

dialog on the display part 13.

5   When the user chooses OK to start the copying

process at step S438, the terminal 30 sends to the image

forming apparatus 1000 an acquirable document type list

request command to request a list of document types

acquirable from the image forming apparatus 1000 at step

10   S439.

At step S439-2, the image forming apparatus

1000, in response to receipt of the acquirable document

type list request command from the terminal 30, sends

the acquirable document type list to the terminal 30.

15   At step S440, the terminal 30, in response to

receipt of the acquirable document type list from the

image forming apparatus 1000, maintains the acquirable

document type list as a transmitter document type list

302.   Furthermore, the terminal 30 sends to the image

20   forming apparatus 1200 a writable document type list

request command to request a list of document types

writable in the image forming apparatus 1200.

At step S440-2, the image forming apparatus

1200, in response to receipt of the writable document

25   type list request command from the terminal 30, sends

the writable document type list to the terminal 30.

At step S441, the terminal 30, in response to receipt of the writable document type list from the image forming apparatus 1200, maintains the writable

5 document type list as a receiver document type list 304. Then, the sequence control part 310 of the terminal 30 uses the document type determination part 320 to determine whether or not there is a document type acquirable from the image forming apparatus 1000 and

10 writable in the image forming apparatus 1200 based on the transmitter document type list 302 and the receiver document type list 304, and determines the best document type. Based on the determination, if there are a plurality of such document types, the document type

15 determination part 320 determines one of the document types as the best document type. If there is no such a document type, the document type determination part 320 determines a predetermined document type as the best document type.

20 At step S442, the terminal 30 sends to the image forming apparatus 1200 a document writing ticket request command to request a ticket to write documents in the image forming apparatus 1200.

At step S442-2, the image forming apparatus

25 1200, in response to receipt of the document writing

ticket request command from the terminal 30, sends the ticket to the terminal 30.

At step S443, the terminal 30, in response to receipt of the document writing ticket from the image forming apparatus 1200, sends to the image forming apparatus 1000 a document writing request command to write the selected document stored in the image forming apparatus 1000 in the image forming apparatus 1200 by authority of the ticket. At this time, the determined document type is designated in the document writing request command.

At step S444, the image forming apparatus 1000, in response to receipt of the document writing request command from the terminal 30, sends to the image forming apparatus 1200 an empty file creation request command to request the image forming apparatus 1200 to create an empty file.

At step S444-2, the image forming apparatus 1200, in response to receipt of the empty file creation request command from the image forming apparatus 1000, creates an empty file and sends the file ID of the file to the image forming apparatus 1000.

At step S445, the image forming apparatus 1000, in response to receipt of the file ID from the image forming apparatus 1200, sends to the image forming

apparatus 1200 a page image writing request command to write a page image in the file identified by the file ID by authority of the ticket.

At step S446, the image forming apparatus 1200,
5 in response to receipt of the page image writing request command from the image forming apparatus 1000, uses the document management Web service execution part 130 to store the page image received from the image forming apparatus 1000 in the file.

10 At step S446-2, after storing of all page images of the selected document, the image forming apparatus 1200 sends to the image forming apparatus 1000 a page image writing request completion message. In the page image writing request command, for example, a
15 plurality of page images of the selected document may be designated. Alternatively, whenever the image forming apparatus 1200 receives each page image from the image forming apparatus 1000, the image forming apparatus 1200 may iteratively send to the image forming apparatus 1000
20 a page image request command for the next page image.

At step S446-4, the image forming apparatus 1000, in response to receipt of the page image writing request completion message from the image forming apparatus 1200, sends to the terminal 30 a document
25 writing request completion message to indicate that the

document writing request has been fulfilled.

At step S447, the terminal 30, in response to receipt of the document writing request completion message from the image forming apparatus 1000, displays

5   on the display part 13 a copying completion dialog to indicate that the copying process has been terminated.

In the terminal 30, which serves as an operator apparatus, the SOAP command creation part 210C of the client part 200C sets request commands sent to

10   the image forming apparatuses 1000 and 1200 as SOAP commands incorporated in messages of HTTP requests (S431, S432, S434, S435, S436, S439, S440, S442 and S443). The SOAP response interpretation part 220C of the client part 200C extracts HTTP responses for process results

15   corresponding to the HTTP requests.

In the image forming apparatus 1200, which serves as the document receiver apparatus, the SOAP command analysis part 110 of the server part 100 analyzes received request commands as SOAP commands, and

20   the document management Web service execution part 130 operates corresponding to the SOAP commands. The SOAP response creation part 120 of the server part 100 provides the terminal 30 and the image forming apparatus 1000 with process results of the document management Web

25   service execution part 130 as Web services (S436-2,

S440-2, S442-2, S444-2 and S446-2).

On the other hand, in the image forming apparatus 1000, which serves as the document transmitter apparatus, the SOAP command creation part 210B of the

5   client part 200B sets request commands sent to the image forming apparatus 1200 as SOAP commands incorporated in messages of HTTP requests (S444 and S445). The SOAP response interpretation part 220B of the client part 200B extracts HTTP responses for process results

10   corresponding to the HTTP requests. Also, the SOAP command analysis part 110B of the server part 100B analyzes received request commands as SOAP commands, and the SOAP response creation part 120B of the server part 100B provides process results corresponding to the SOAP

15   command as Web services to the terminal 30 (S431-2, S432-2, S434-2, S435-2 and S439-2).

According to the above-mentioned PUSH type document copying sequence, when a user of the terminal 30 having the document process control part 300 selects

20   a document stored in the image forming apparatus 1000, the document can be copied from the image forming apparatus 1000 to the image forming apparatus 1200 by storing the document in HDD 1303 of the image forming apparatus 1200 in an appropriate document type.

25   A description is given, with reference to FIG.

52 and FIG. 53, of the above-mentioned individual request commands according to the fourth embodiment.

FIG. 52 shows an exemplary HTTP request for a page image writing request command according to the fourth embodiment. In FIG. 52, the same portion as those of FIG. 45 are designated by the same reference numerals and the description thereof is omitted.

Referring to FIG. 52, a code portion 81 indicates that there are a plurality of differently formatted data items in the HTTP request. In a code portion 86, "XX_boundary" indicates a boundary between the data item. In a code portion 82, text data information is provided. For example, the text data information may include a text description type, a code type, and the length of the text data. In a code portion 80, a SOAP command is specified by sandwiching between <operation> and </operation>. For example, if "putFile(FileID)" is designated as the SOAP command, a page image stored in the image forming apparatus 1000 is requested to be written in a file designated by FileID.

On the other hand, in a code portion 84, image data information is provided. For example, the image data information may include an image data type, a transferred data type, such as "text" and "binary", the length of the image data. Subsequently, image data 85

are provided. For example, if the image data type is
"Tiff" and the transferred data type is "binary", the
image data 85 are provided as binary Tiff image data.

In response to receipt of such an HTTP request
shown in FIG. 52, the image forming apparatus 1200 can
extract binary Tiff image data from the HTTP request and
fulfill the page image writing request by writing the
extracted image data in HDD 1303.

FIG. 53 shows an exemplary HTTP response
corresponding to the HTTP request shown in FIG. 52
according to the fourth embodiment. In FIG. 53, the
same code portions as those shown in FIG. 46 are
designated by the same reference numerals and the
description thereof is omitted.

Referring to FIG. 53, a code portion 44
includes a code portion 87 ranging from
<ns:documentmanagementResponse> to
</ns:documentmanagementResponse>. In the code portion
87, a process result of the page image writing request
is provided. In a code portion 88 ranging from <result>
to </result>, for example, "success" is provided to
indicate that the page image writing request has been
fulfilled.

In this example, the HTTP request
incorporating image data is sent to the image forming

apparatus 1200. However, the image data may be transmitted and received, for example, in accordance with file transfer protocol (ftp3).

In the PUSH type document copying process

5 according to the fourth embodiment of the present invention, the following SOAP commands are used.

[Table 4]

SOAP command	Operation
getList	get a document list
getThumbnail	get thumbnail images
getFileInfo	get file bibliographic information
getSystemInfo	get system information
getFileVariation	get an acquirable or writable document type list
getInsertTicket	get a ticket to write (insert) a document
insertFileByTicket	write (insert) document data by a ticket
createDoc	create an empty document
putFile(FileID)	write a document in a file specified a file ID

These SOAP commands are designated by sandwiching between <operation> and </operation> in the

10 SOAP body as described with reference to FIG. 45, FIG. 47, FIG. 49 and FIG. 52.

In the fourth embodiment, the screens shown in FIG. 16 through FIG. 19 according to the first embodiment are provided to a user of the terminal 30.

15 Thus, the description thereof is omitted.

A description is given, with reference to FIG.

54 through FIG. 56, of a document copying process
according to a fifth embodiment of the present invention.

In the fifth embodiment, a document stored in
the image forming apparatus 1000 is printed out in the

5   image forming apparatus 1200 in cooperation with the
image forming apparatuses 1000 and 1200 and the terminal
30 having the document process control part 300.

FIG. 54 shows an exemplary structure of a
network system according to the fifth embodiment.

10   Referring to FIG. 54, the image forming
apparatus 1200 prints out document data or image data
(hereinafter which are referred to as a document) stored
in HDD 1303B of the image forming apparatus 1000.
Namely, the image forming apparatus 1000, which serves

15 as a document transmitter apparatus, sends a document
stored therein to the image forming apparatus 1200. On
the other hand, the image forming apparatus 1200, which
serves as a document receiver apparatus, produces a copy
4 of the document received from the image forming

20 apparatus 1000.

A description is given, with reference to FIG.
55, of a functional structure of the image forming
apparatus 1200 according to the fifth embodiment.

FIG. 55 shows an exemplary functional

25 structure of the image forming apparatus 1200 according

to the fifth embodiment. In FIG. 21, the same

components as those in FIG. 4 are designated by the same

reference numerals and the description thereof is

omitted. Also, only primary functional components of

5   the image forming apparatus 1200 are illustrated and the

other components are omitted.

Referring to FIG. 55, the document management

Web service application 1216 of the image forming

apparatus 1200 differs from the document management Web

10   service application 1216 according to the fourth

embodiment in that the document management Web service

application 1216 according to the fifth embodiment

further includes a printing Web service execution part

140. The printing Web service execution part 140, which

15   serves as a Web service function (WSF) to provide Web

services, prints out a selected document by means of the

plotter 1201.

On the other hand, the image forming apparatus

1000 and the terminal 30 have the same functional

20   structures and hardware configurations as those

according to the fourth embodiment. Namely, the image

forming apparatus 1000 has the functional structure

shown in FIG. 42, and the terminal 30 having the

document process control part 300 has the functional

25   structure shown in FIG. 55.

A description is given, with reference to FIG.
56, of a document printing process according to the
fifth embodiment.

FIG. 56 shows an exemplary operation of a PULL
type document printing sequence according to the fifth
embodiment.

Referring to FIG. 55, a user of the terminal
30 selects the image forming apparatus 1000
accommodating a desired document from listed apparatuses,
which are displayed on the display part 13, connected to
the terminal 30 via the network 15 at step S510.

At step S511, the terminal 30 sends to the
image forming apparatus 1000 a document list request
command to request a list of documents stored in the
image forming apparatus 1000.

At step S511-2, the image forming apparatus
1000, in response to receipt of the document list
request command from the terminal 30, uses the document
management Web service execution part 130B to acquire
the document list from HDD 1303B and sends the document
list to the terminal 30.

At step S512, the terminal 30, in response to
receipt of the document list from the image forming
apparatus 1000, sends to the image forming apparatus
1000 a thumbnail request command to request thumbnail

data to de displayed on the display part 13.

At step S512-2, when the image forming apparatus 1000 receives the thumbnail request command from the terminal 30, the document management Web

5   service execution part 130B operates corresponding to the thumbnail request command. Then, the image forming apparatus 1000 sends to the terminal 30 the thumbnail data acquired by the document management Web service execution part 130B. For example, the thumbnail data

10   are reduced-size image data of the top pages of documents stored in the image forming apparatus 1000.

At step S513, when the document list of the image forming apparatus 1000 is displayed in thumbnail representation on the display part 13 of the terminal 30,

15   the user determines which apparatus should print out which document by dragging and dropping a thumbnail of a desired document toward a desired apparatus. In this embodiment, the user drags and drops a document stored in the image forming apparatus 1000 toward the image

20   forming apparatus 1200.

At step S514, the terminal 30 sends to the image forming apparatus 1000 a bibliographic information request command to request bibliographic information regarding the selected document.

25   At step S514-2, the image forming apparatus

1000, in response to receipt of the bibliographic

information request command from the terminal 30, uses

the document management Web service execution part 130B

to acquire the bibliographic information from HDD 1303B

5   and sends the bibliographic information to the terminal

30.

At step S515, the terminal 30, in response to

receipt of the bibliographic information from the image

forming apparatus 1000, sends to the image forming

10   apparatus 1200 a system information request command to

request system information regarding the image forming

apparatus 1200.

At step S515-2, the image forming apparatus

1200, in response to receipt of the system information

15   request command from the terminal 30, sends the system

information to the terminal 30.

At step S516, the terminal 30, in response to

receipt of the system information from the image forming

apparatus 1200, examines feasibility of the printing

20   process using a ticket. Then, the terminal 30 sends to

the image forming apparatus 1000 an acquirable document

type list request command to request a list of document

types acquirable from the image forming apparatus 1000.

At step S516-2, the image forming apparatus

25   1000, in response to receipt of the acquirable document

type list request command from the terminal 30, sends
the acquirable document type list to the terminal 30.

At step S517, the terminal 30, in response to
receipt of the acquirable document type list from the
5   image forming apparatus 1000, maintains the acquirable
document type list as a transmitter document type list
302. Furthermore, the terminal 30 sends to the image
forming apparatus 1200 a printable document type list
request command to request a list of document types
10   printable in the image forming apparatus 1200.

At step S517-2, the image forming apparatus
1200, in response to receipt of the printable document
type list.request command from the terminal 30, sends
the printable document type list to the terminal 30.

15   At step S518, the terminal 30, in response to
receipt of the printable document type list from the
image forming apparatus 1200, maintains the printable
document type list as a receiver document type list 304.
Then, the terminal 30 displays a copying or printing
20   confirmation dialog, as described with respect to the
second embodiment, on the display part 13.

When the user chooses OK to start the printing
process at step S519, the sequence control part 310 of
the terminal 30 uses the document type determination
25   part 320 to determine whether or not there is a document

type acquirable from the image forming apparatus 1000 and printable in the image forming apparatus 1200 based on the transmitter document type list 302 and the receiver document type list 304, and determines the best

5   document type at step S520. Based on the determination, if there are a plurality of such document types, the document type determination part 320 determines one of the document types as the best document type. If there is no such a document type, the document type

10   determination part 320 determines a predetermined document type as the best document type.

At step S521, the terminal 30 sends to the image forming apparatus 1000 a ticket request command to request a ticket to use documents stored in the image

15   forming apparatus 1000.

At step S521-2, the image forming apparatus 1000, in response to receipt of the ticket request command from the terminal 30, sends the ticket to the terminal 30.

20   At step S522, the terminal 30, in response to receipt of the ticket from the image forming apparatus 1000, sends to the image forming apparatus 1200 a printing attribute information request command to request printing attribute information to indicate

25   whether or not the selected document should be double-

sided printed or single-sided printed.

At step S522-2, the image forming apparatus 1000, in response to receipt of the printing attribute information request command from the terminal 30, sends

5 the printing attribute information to the terminal 30.

At step S523, the terminal 30, in response to receipt of the printing attribute information from the image forming apparatus 1000, sends to the image forming apparatus 1200 a job creation request command to create

10 a job for the printing process.

At step S523-2, the image forming apparatus 1200, in response to receipt of the job creation request command from the terminal 30, creates the job for the printing process and sends to the terminal 30 a job ID

15 to identify the job.

At step S524, the terminal 30 sends to the image forming apparatus 1200 a printing attribute setting request command to set printing attributes.

At step S524-2, the image forming apparatus

20 1200, in response to receipt of the printing attribute setting request command from the terminal 30, sets the printing attributes and sends to the terminal 30 a printing setting completion message to indicate that the printing attributes have been set.

25 At step S525, the terminal 30, in response to

receipt of the printing attribute setting completion

message from the image forming apparatus 1200, sends to

the image forming apparatus 1200 a document printing

request command to print the selected document by

5   authority of the ticket acquired at step S521-2.

At step S524, the image forming apparatus 1200,

in response to receipt of the document printing request

command from the terminal 30, sends to the image forming

apparatus 1000 a page image request command to request a

10   page image of the document in the format of the document

type designated in the ticket.

At step S526-2, the image forming apparatus

1000, in response to receipt of the page image request

command from the image forming apparatus 1200, sends the

15   page image to the image forming apparatus 1200. In the

page image request command, for example, a plurality of

page images of the selected document may be designated.

Alternatively, whenever the image forming apparatus 1200

receives each page image from the image forming

20   apparatus 1000, the image forming apparatus 1200 may

iteratively send to the image forming apparatus 1000 a

page image request command for the next page image.

At step S527, after the image forming

apparatus 1200 receives all page images of the selected

25   document from the image forming apparatus 1000, the

printing Web service execution part 140 uses the plotter 1201 to print out the page images.

At step S527-2, after completion of the printing process, the image forming apparatus 1200 sends to the terminal 30 a printing request completion message to indicate that the printing request has been fulfilled.

At step S528, the terminal 30, in response to receipt of the printing completion message from the image forming apparatus 1200, displays on the display part 13 a printing completion dialog to indicated that the printing process has been terminated.

In the terminal 30, which serves as an operator apparatus, the SOAP command creation part 210C of the client part 200C sets request commands sent to the image forming apparatuses 1000 and 1200 as SOAP commands incorporated in messages of HTTP requests (S511, S512, S514, S515, S516, S517, S521, S522, S523, S524 and S525). The SOAP interpretation part 220C of the client part 200C extracts HTTP responses for process results corresponding to the HTTP requests.

In the image forming apparatus 1000, which serves as the document transmitter apparatus, the SOAP command analysis part 110B of the server part 100B analyzes received request commands as SOAP commands, and the document management Web service execution part 130B

operates corresponding to the SOAP commands. The SOAP

response creation part 120B of the server part 100

provides the terminal 30 or the image forming apparatus

1200 with process results of the document management Web

5 service execution part 130B as Web services (S511-2,

S512-2, S514-2, S516-2, S521-2, S522-2 and S524-2).

On the other hand, in the image forming

apparatus 1200, which serves as the document receiver

apparatus, the SOAP command creation part 210 of the

10 client part 200 sets request commands sent to the image

forming apparatus 1000 as SOAP commands incorporated in

messages of HTTP requests (S526). The SOAP response

interpretation part 220 of the client part 200 extracts

HTTP responses for process results corresponding to the

15 HTTP requests. Also, the SOAP command analysis part 110

of the server part. 100 analyzes received request

commands as SOAP commands, and the SOAP response

creation part 120 of the server part 100 provides

process results corresponding to the SOAP command as Web

20 services to the terminal 30 (S515-2, S517-2, S523-2,

S524-2, S525-2 and S527-2).

According to the above-mentioned PULL type

document copying sequence, when a user of the terminal

30 having the document process control part 300 selects

25 a document stored in the image forming apparatus 1000,

the document stored in the image forming apparatus 1000
can be printed in the image forming apparatus 1200 by
means of the plotter 1201.

In the fifth embodiment, the screens shown in
5   FIG. 16 through FIG. 19 according to the second
embodiment are provided to a user of the terminal 30.
Thus, the description thereof is omitted.

In the fourth and fifth embodiment of the
present invention, when the terminal 30 having the
10   document process control part 300 requests a selected
document stored in the image forming apparatus 1000 in
the format of a document type that is determined based
on document types processable to the image forming
apparatuses 1000 and 1200, the corresponding image
15   processing process can be performed in the image forming
apparatus 1200 in cooperation with the apparatuses
connected to each other via the network. For example,
if the size of a document that the image forming
apparatus 1000, which serves as the document transmitter
20   apparatus, accommodates is greater than the maximal size
of documents that the image forming apparatus 1200,
which serves as the document receiver apparatus, can
store, the document process control part 300 of the
terminal 30 can use an image scaling function thereof to
25   send a reduced-size page image to the image forming

apparatus 1200 based on determination of the document type determination part 320.

Also, since the document process control part 300 flexibly controls cooperation with the image forming apparatuses 1000 and 1200 depending on types of processes such as a copying process and a printing process, it is possible to perform various types of processes through cooperation with apparatuses connected via a network.

In the fourth and fifth embodiments, the copying process and the printing process that are performed through cooperation with apparatuses connected via a network are described. However, the present invention is not limited to these processes. The present invention is applicable to file management, scanner control and so on. Furthermore, the present invention is applicable to process information regarding the image forming apparatuses 1000 and 1200.

Also, the image forming apparatuses 1000 and 1200 and the terminal 30 according to the embodiments are not limited to communication via a fixed line LAN (Local Area Network). In other words, although physical layers differs in a network system, such as a wireless LAN and Bluetooth, SOAP messages can be exchanged in such a network system in accordance with TCP/IP

(Transmission Control Protocol/Internet Protocol). Thus, it is possible to implement various processes according to the embodiments as Web services in accordance with http and SOAP. Furthermore, communicated contents are

5 allowed to be extended in a parallel system, such as a centronics and SCSI. Thus, as long as there is agreement between devices that will communicate each other, it is possible to implement message exchange in accordance with SOAP.

10 The present invention is not limited to the specifically disclosed embodiments, and variations and modifications may be made without departing from the scope of the present invention.

The present application is based on Japanese

15 Patent Priority Applications No. 2002-275976 filed September 20, 2002, No. 2002-275978 filed September 20, 2002 filed September 20, 2002, No. 2002-275985 filed September 20, 2002, the entire contents of which are hereby incorporated by reference.